



DLR Group

Architecture
Engineering
Planning
Interiors

Garrett College

**Community Education and Performing Arts Center
(CEPAC)
McHenry, Maryland**

Project Manual – Volume 1 of 2

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Garrett College Project No. CC-15-MC17-449

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McHENRY, MARYLAND

56-18107-00
15 NOVEMBER 2019
ISSUED FOR BID AND PERMIT

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END OF SECTION 000115

SECTION 001113 – PROPOSAL INVITATION

GARRETT COLLEGE will receive sealed proposals from pre-qualified general contractors for the renovation and construction of the new Community Education and Performing Arts Center on the college campus in McHenry, Maryland. Proposal documents, drawings and specifications for this project will be available on November 20, 2019 and may be downloaded on-line at no charge by logging onto the following website:

<https://www.garrettcollege.edu/cepac.php>

Addenda will be available via the same website periodically throughout the duration of the proposal period. Proposing Contractors are responsible for checking the site to ensure that they have the required information to make an informed proposal. A pre-proposal meeting will be held on November 22, 2019 at 11:00 a.m. in the college's Special Events Center, Building 800. Questions related to this proposal process or to the contract document may be directed by e-mail to GCCEPAC@garrettcollege.edu. Questions will be received until noon December 4, 2019. Sealed proposal packages must be labeled "CEPAC Project" and will be received until 2:00 p.m. December 17, 2019 at the Office of the Vice President of Administration & Finance, Garrett College, 687 Mosser Road, McHenry, MD 21541.

Garrett College reserves the right to reject any and all proposals and to waive irregularities and informalities in the submittal and evaluation process. The RFP does not obligate the college to pay any costs incurred by respondents in the preparation and submission of their statement of qualifications. Furthermore, the RFP does not obligate the college to accept or contract for any expressed or implied services. It is Garrett College's policy to assure that no person shall, on the grounds of race, color, national origin or sex, as provided by Title VI of the Civil Rights Act of 1964, be excluded from participation in, be denied the benefits of, or be otherwise discriminated against regarding this RFP process. The college is committed to a program of equal employment opportunity regardless of race, color, creed, sex, age, nationality, disability, or sexual orientation. The successful contractor must agree to comply with Garrett College's equal opportunity requirements.

Response to the RFP must address the following criteria:

- Completion of Proposal Form and other forms specified in the project specifications.
- A narrative describing the firm's proposed approach to the construction. Firm should discuss any major pitfalls or potential problems noted in the drawings or specs. Explain why your firm is the best contractor for this project. Identify and discuss proposed timeline for project including proposed start/finish dates, how you intend to handle inclement weather, your expectation for potential delays, etc.
- Resumes of proposed site construction team.
- A preliminary list of proposed principal subcontractors.

GARRETT COLLEGE CEPAC
GARRETT COLLEGE
McHENRY, MARYLAND

56-18107-00
15 NOVEMBER 2019
ISSUED FOR BID AND PERMIT

Proposals will be evaluated, and the award shall be made to the qualified bidder submitting the lowest acceptable responsive bid.

In accordance with Maryland Law, the college reserves the right to ask the top firms with the best overall proposals to conduct on campus interviews to expound/justify their proposals. In addition, the college may ask that the top firms revise their initial proposals by submitting best and final offers. As a result, information contained in the proposals will be treated as confidential and will not be disclosed publically or to other offerors until after a contract has been negotiated and signed by both parties.

END OF PROPOSAL INVITATION

 **AIA[®] Document A701[™] – 2018****Instructions to Bidders**

for the following Project:

(Name, location, and detailed description)

Garrett College Community Education and Performing Arts Center (CEPAC)
Garrett College
687 Mosser Road, McHenry, Maryland 21541

THE OWNER:

(Name, legal status, address, and other information)

Garrett College
687 Mosser Road
McHenry, Maryland 21541

THE ARCHITECT:

(Name, legal status, address, and other information)

DLR Group of DC, P.C.
419 7th Street, NW
Second Floor
Washington, DC 20004

TABLE OF ARTICLES

1	DEFINITIONS
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3	BIDDING DOCUMENTS
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6	POST-BID INFORMATION
7	PERFORMANCE BOND AND PAYMENT BOND
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.)

Refer to Proposal Invitation for access to 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.)

Submit requests for clarification or interpretation of the Bidding Documents via email to GCCEPAC@GarrettCollege.edu

§ 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 Refer to Supplementary Instructions to Bidders

§ 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.)

Addenda will be issued via the project website <https://www.garrettcollege.edu/cepac.php>

§ 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.)

Refer to Bid Security information in Supplementary Instructions to Bidders.

§ 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 45 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.)

Three (3) paper copies to location indicated in the Proposal Invitation.

§ 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

(Paragraphs deleted)

Refer to Supplementary Instructions to Bidders

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

(Paragraph deleted)

§ 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 Refer to Supplemental Instructions to Bidders.

§ 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

Deleted. Refer to Supplementary Instructions to Bidders.

(Table deleted)(Paragraphs deleted)(Paragraphs deleted)

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 that modify and add to the requirements of the Instructions to Bidders.

1.2 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS, GENERAL

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

1.3 ARTICLE 3 - BIDDING DOCUMENTS

- A. 3.3 - Substitutions:
1. Delete Section 3.3.2.1 and replace with the following:
 - a. 3.3.2.1 – “No substitution will be considered prior to receipt of Proposals unless written request for approval has been received by the College Procurement Office at least fourteen (14) days prior to the date for receipt of Proposals. The College shall refer this information to the Architect for decision. The Architect’s decision of approval or disapproval of the proposed substitution shall be final.”
- B. 3.4 - Addenda:
1. Add Section 3.4.5:
 - a. 3.4.5 – “Addenda will become part of the Contract Documents when the Construction Contract is executed.”
 2. Add Section 3.4.6:
 - a. 3.4.6: - “All questions regarding the proposal shall be directed to the College and the Architect at the time indicated in the Proposal Invitation. Questions are to be submitted in writing via email to GCCEPAC@garrettcollege.edu. Bidders are advised that the Architect reserves the right to use its best judgement in responding to any questions received after the stated cut-off date for questions.”

1.4 ARTICLE 4 - BIDDING PROCEDURES

- A. 4.1 - Preparation of Bids:
1. Revise Section 4.1.1:
 - a. 4.1.1 – “Proposals shall be submitted on forms identical to the forms included with the Proposal and Contract Documents. Proposals shall be submitted in the quantity stated under revised Section 4.3.5.”

B. 4.2 – Bid Security:

1. Revise Section 4.2.4:

- a. 4.2.4 – Add as follows: “Each proposal shall be accompanied by a bid bond or guarantee of five percent (5%) of the amount of the bid, which shall be a certified check, cashier’s check or bid bond payable to Garrett College. The sureties of all bonds shall be of such surety company or companies as are approved by the State of Maryland and are authorized to transact business in Garrett County. Such bid bond or check shall be submitted with the understanding that it shall guarantee that the proposing Contractor will not withdraw such proposal during the period of 90 days following the opening of proposals: that if such bid is accepted, the proposing Contractor will accept and perform under the terms of the Contract. The bid guarantee will be returned upon the award of the Contract.”

C. 4.3 - Submission of Bids:

1. Revise Section 4.3.2:

- a. 4.3.2 – Add as follows: “Late proposals will not be considered and will be logged in and then returned to the Bidder unopened. ALL PROPOSALS ARE DUE AT THE TIME AND ADDRESS LISTED IN THE PROPOSAL INVITATION.”

2. Revise Section 4.3.5:

- a. 4.3.5 – Add as follows: “One original and three (3) copies of the Proposal shall be submitted, signed, sealed and addressed ‘CEPAC Project.’ Oral, telephone, telegraphic, emailed, or faxed proposals are invalid and will not receive consideration.”

D. 4.4 - Modification or Withdrawal of Bids:

1. Revise Section 4.4.1:

- a. 4.4.1 – Add as follows: “A proposal may not be modified, withdrawn, or cancelled by the proposing Contractor for a period of 90 days after the time and date of the bid.

2. Delete Section 4.4.3 and replace with the following:

- a. 4.4.3 – “After the proposal due date, in the event of an error, proposals may not be amended. The College does, however, reserve the right to contact any or all proposing Contractors to verify information included in the proposal and to clarify any questions regarding the information submitted in the proposal, in order to ascertain whether the proposal received is both responsive and responsible. The College also reserves the right to waive any formalities, informalities, or technicalities as are deemed appropriate, necessary or in the College’s best interest. Specific to cost proposals, in the event of unit price and its extension, the unit price will govern.”

1.5 ARTICLE 5 - CONSIDERATION OF BIDS

A. 5.1 – Opening of Bids. Delete this paragraph in its entirety.

B. 5.3 - Acceptance of Bids (Award):

1. Revise Section 5.3.1:

- a. 5.3.1 – “The Owner shall have the right to waive informalities, formalities, or irregularities in a proposal received; to request any additional information

necessary to clarify or determine whether the proposal is in fact responsive and responsible; and to accept the proposal only, if in the College's judgement, it is reasonable and in the College's best interest to accept the proposal."

2. Add Section 5.3.3:
 - a. 5.3.3 – "Proposing Contractors are advised that this project is to be jointly funded by both State and local funds and therefore is subject to all applicable Federal, State, and local laws, codes, regulations, and Board of Public Works Advisories. To that end, determination of the successful bidder may be subject to any and all applicable State laws, regulations, codes, and Board of Public Works Advisories. These may include, but not be limited to economic benefit factors, reciprocal preference, etc."

1.6 ARTICLE 6 - POSTBID INFORMATION

- A. 6.1 - Contractor's Qualification Statement:
 1. Replace Section 6.1 with the following:
 - a. 6.1 – "The College reserves the right to request any additional information it deems necessary to determine the overall responsibility and responsiveness of a proposing Contractor(s) and the respective proposal(s) and also the right to make such investigations as are deemed necessary to determine the ability of the proposing Contractor to perform the work specified. This may include, but is not limited to, the right to request any or all information necessary to clarify a bid, a copy of a proposing Contractor's current, audited financial statements which have been prepared within the last six (6) months, additional references, a list of projects currently underway, etc. The College reserves the right to reject any bid if the evidence submitted by, or the investigation of such proposing Contractor fails to satisfy the College that the bidder is properly qualified to carry out the obligations of the Contract and to complete the work. Conditional proposals will not be accepted."

1.7 ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

- A. 7.1 - Bond Requirements:
 1. Replace Section 7.1.1 with the following:
 - a. 7.1.1 – "The College shall require the selected proposing Contractor to furnish a Performance Bond and a Labor and Materials Bond covering the faithful performance of the Contract and the payment of all obligations arising thereunder in such form and amount as specified. Unless otherwise approved, bonds shall be obtained from the same surety that furnished the Bid security. The issuing surety must be licensed to write bonds in the State of Maryland. The Bond shall be executed on AIA Document A312, in an amount equal to 100 percent of the Contract Sum."
- B. 7.2 - Time of Delivery and Form of Bonds:
 1. Replace Section 7.2.1 with the following:
 - a. 7.2.1 – "The Bidder shall deliver the required bonds to Owner no later than 10 days following the date of execution of the Contract and before any work begins. If

the work is commenced prior thereto, in response to a letter of intent, the Bidder shall furnish and deliver such bonds to the Owner, prior to the commencement of work.”

2. Replace Section 7.2.3 with the following:
 - a. 7.2.3 – “Bonds shall be executed and be in force on or before the date of the execution of the Contract in accordance with Section 7.2.1.”

1.8 ARTICLE 8 - FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

- A. Unless noted otherwise in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor (AIA Document A101- 2017 where the basis of payment is a Stipulated Sum. A copy for reference is included in the Project Manual.

1.9 ARTICLE 9 – SUPPLEMENTARY INFORMATION

- A. Add Article 9:
 1. 9.1 – PRE-BID CONFERENCE: A pre-proposal conference will be held on date and time and at location indicated on the Proposal Invitation. Response to any questions regarding the project, bid documents or process will be handled at the pre-bid conference and communicated to all bidders of record via formal written addenda to the bid, as deemed appropriate and necessary.
 2. 9.2 – PERMITS: The Owner shall obtain zoning permits and easements as required. The Owner shall apply for the building permit but the Contractor shall pick up the permit and pay for the permit and charge the cost of permit fees to the Lump Sum Allowance as described in Section 012100 “Allowances.” All other permits, trade permits, fees, certificates, and licenses necessary for the execution and completion of the Work are the responsibility of the Contractor and all such fees are to be included in the Bid Price.
 - a. A copy of the approved and stamped Drawings will be provided to the Contractor at the commencement of the Work. These documents are to be kept in good condition at the job site as required by Garrett County and the State of Maryland.
 3. 9.3 – PROPOSAL AWARDS: All proposal awards are subject to final approval of contract award by the Garrett College Board of Trustees. Proposing Contractors are reminded that funding for this project comes from both State and local funds and thus final award of contract is subject to the availability of funding for this project. Moreover, final award of contract is subject to all applicable Federal, State, and local laws, codes, regulations and Board of Public Works Advisories, and must also be approved by the State of Maryland Board of Public Works.
 4. 9.4 – The Contractor shall be responsible to the College and the State for acts and omissions of its employees, subcontractors, and suppliers at any tier of the project, and their agents and employees performing any of the work to or for the project.

END OF SECTION 002213

DOCUMENT 003126 - EXISTING HAZARDOUS MATERIAL INFORMATION

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. A Limited Asbestos-Containing Materials Survey Technical Report for Project, prepared by Boggs Environmental Consultants, dated September 17, 2019, is available for viewing as appended to this Project Manual as an Appendix.
- C. A Lead-Based Paint Inspection Technical Report for Project, prepared by Boggs Environmental Consultants, dated September 13, 2019, is available for viewing as appended to this Project Manual as an Appendix.
- D. Related Requirements:
 - 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
 - 2. Document 003132 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to bidders.
 - 3. Section 024116 "Structure Demolition" for notification requirements if materials suspected of containing hazardous materials are encountered.
 - 4. Hazardous material specifications included in Division 02 of this Project Manual: Hazardous Material Abatement Project Manual, Issued for Bid and Permit, Garrett College Building #700 & Building #800, prepared by Boggs Environmental Consultants, dated November 15, 2019.

END OF DOCUMENT 003126

DOCUMENT 003132 - GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- 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. A geotechnical investigation report for Project, prepared by Triad Engineering, Inc., dated July 31, 2019, is available for viewing as appended to this Project Manual as an Appendix.
 - 1. 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. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.
- D. Related Requirements:
 - 1. Document 002113 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
 - 2. Document 003126 "Existing Hazardous Material Information" for hazardous materials reports that are made available to bidders.

END OF DOCUMENT 003132

SECTION 004113 - BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: Garrett College Community Education and Performing Arts Center.
- C. Project Location: Garrett College, 687 Mosser Road, McHenry, Maryland 21541.
- D. Owner: Garrett College, 687 Mosser Road, McHenry, Maryland 21541.
- E. Owner Project Number: CC-15-MC17-449.
- F. Architect: DLR Group of DC, P.C.
- G. Architect Project Number: 56-18107-00.

1.2 CERTIFICATIONS AND BASE BID

- A. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by DLR Group and Architect's consultants, having visited the site and locality where Work is to be performed, and being familiar with the legal requirements (Federal, State, and local laws, ordinances, rules, and regulations,) and all conditions and requirements of the Work affecting costs, progress, or performance of the Work and has made such independent investigation as Bidder deems necessary, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

- 1. _____ Dollars (\$_____).
- 2. The above amount may be modified by amounts indicated by the Bidder on the attached Document 004322 "Unit Prices Form" and Document 004323 "Alternates Form."
- 3. Dollar amounts identified on Document 00432 "Informational Prices Form" shall be included in the Base Bid indicated above. These prices are for informational purposes for Owner.
- 4. Allowances identified on Document 004321 "Allowances Form" shall be included in the Base Bid indicated above.

1.3 BID GUARANTEE

- A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice of Award, if offered within 60 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:

1. _____ Dollars (\$_____).

- B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

1.4 TIME OF COMPLETION

- A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Owner, and shall fully complete the Work within 17 calendar months. Substantial Completion must be by October 1, 2021. Final completion must be by December 1, 2021.

1.5 ACKNOWLEDGEMENT OF ADDENDA

- A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

1. Addendum No. 1, dated _____.
2. Addendum No. 2, dated _____.
3. Addendum No. 3, dated _____.
4. Addendum No. 4, dated _____.

1.6 BID SUPPLEMENTS

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

1. Bid Form Supplement - Informational Prices.
2. Bid Form Supplement - Alternates.
3. Bid Form Supplement - Unit Prices.
4. Bid Form Supplement - Allowances.
5. Bid Form Supplement - Bid Bond Form (AIA Document A310-2010).
6. Bid Form Supplement - Payment Bond Form (AIA Document A312-2010).
7. Bid Form Supplement - Performance Bond Form (AIA Document A312-2010).
8. Form of MBE Affidavit.

1.7 CONTRACTOR'S LICENSE

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

1.8 SUBMISSION OF BID

- A. Respectfully submitted this ____ day of _____, 2019.
- B. Submitted By: _____ (Name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).
- F. Witnessed By: _____ (Handwritten signature).
- G. Attest: _____ (Handwritten signature).
- H. By: _____ (Type or print name).
- I. Title: _____ (Corporate Secretary or Assistant Secretary).
- J. Street Address: _____.
- K. City, State, Zip: _____.
- L. Phone: _____.
- M. License No.: _____.
- N. Federal ID No.: _____ (Affix Corporate Seal Here).

END OF DOCUMENT 004113

RESOLUTION

Resolution No: 2020-1
Date: October 30, 2019
Subject: Local Labor/MBE CEPAC project participation

A Resolution by the Board of Trustees of Garrett Community College (the "College").

Whereas, the College construction of a Community Education and Performing Arts Center on its McHenry Campus is only possible through the joint financial participation of the State of Maryland and Garrett County Government; and

Whereas, the College is currently going through a bidding process to select the firm that will be awarded the construction bid for this project; and

Whereas, the College is committed to promoting the economic development of Garrett County through the construction of the CEPAC; and

Whereas, the College is equally committed to promoting the use of Minority Business Enterprises to this extent possible on this project;

Therefore, be it resolved that the College, through its Board of Trustees, hereby encourages bidders on the CEPAC project to employ local (Garrett County) labor on this project and to use Minority Business Enterprises to make up 10 percent of the total project.



Don Morin, Chair
Garrett College Board of Trustees



FORM OF MBE UTILIZATION AFFIDAVIT

The undersigned as General Contractor does hereby make the following affidavit.

I acknowledge the Minority Business Enterprise participation goal of 10% of the total contract dollar value directly or indirectly from certified minority business enterprise. I am committed to making every effort to achieve this goal for this contract for Garrett College.

In the solicitation of subcontract quotations or offers all Minority Business Enterprise (MBE) subcontractors were provided not less than the same information and amount of time to respond to the solicitations.

The solicitation process was conducted in such a manner so as to otherwise not place MBE subcontractors at a competitive disadvantage to non-MBE subcontractors.

I do solemnly declare and affirm under the penalty of perjury that the contents of the foregoing document are true and correct to the best of my knowledge, information and belief.

Signature of Applicant: _____
Printed Name: _____
Title: _____
Representing: _____
Date: _____

Sworn and subscribed before me this _____ day of _____, 2019.

WHEREAS, I hereunto set my hand and Notary Seal.

My Commission Expires:

SECTION 004320 – INFORMATIONAL PRICES FORM

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: Garrett College Community Education and Performing Arts Center.
- C. Project Location: Garrett College, 687 Mosser Road, McHenry, Maryland 21541.
- D. Owner: Garrett College.
- E. Owner Project Number: CC-15-MC17-449.
- F. Architect/Engineer: DLR Group.
- G. Architect Project Number: 56-18107-00.

1.2 BID FORM SUPPLEMENT

- A. This form is required to be attached to the Bid Form.
- B. The undersigned Bidder certifies that Base Bid submission to which this Bid Supplement is attached includes informational pricing for the items listed below. The cost of these items is included in the base bid price listed on the Bid Form. The intent of these informational prices is to determine the cost for these items as part of the base bid. References are included to indicate general scope. Bidder is responsible for completeness of pricing.

- 1. Boiler Replacement, Basis of Design: Contractor shall demolish two existing Kewanee boilers and Building 800 secondary pump and replace with two new three-pass cast-iron boilers, new secondary pumps serving the CEPAC, and controls integration to Garrett College's current JCI building automation system. Provide modifications to venting, piping, electrical, and fuel oil interconnection for a complete system. Include the abatement of all associated hazardous materials associated with boiler replacement scope. Include existing ceiling demolition and new plaster ceiling with access panels where piping associated with boiler replacement runs. Drawing Sheets D001 and A301B include information related to the ceiling work. Drawing Sheets MD101, M105, M709, ED102 and E204C include mechanical and electrical information related to boiler replacement scope.

_____ Dollars (\$_____).

2. Emergency Generator: Contractor shall provide generator connection cabinet with manual transfer switch, new panelboards ABR1, ABR2, and ABR3, new feeders from MDP-A to new panelboards ABR1, ABR2, and ABR3 and rework all branch circuits and add new branch circuits as indicated to ABR1, ABR2, and ABR3. Replace circuit breakers in MDP-A as indicated. Refer to Drawing Sheets E501, E502, ED102, E201C, and E712.

_____ Dollars (\$_____).

1.3 SUBMISSION OF BID SUPPLEMENT

- A. Respectfully submitted this ____ day of _____, 2019.
- B. Submitted By: _____ (Insert name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).

END OF DOCUMENT 004320

SECTION 004321 - ALLOWANCE FORM

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: Garrett College Community Education and Performing Arts Center.
- C. Project Location: Garrett College, 687 Mosser Road, McHenry, Maryland 21541.
- D. Owner: Garrett College.
- E. Owner Project Number: CC-15-MC17-449.
- F. Architect/Engineer: DLR Group.
- G. Architect Project Number: 56-18107-00.

1.2 BID FORM SUPPLEMENT

- A. This form is required to be attached to the Bid Form.
- B. The undersigned Bidder certifies that Base Bid submission to which this Bid Supplement is attached includes those allowances described in the Contract Documents and scheduled in Section 012100 "Allowances."

1.3 SUBMISSION OF BID SUPPLEMENT

- A. Respectfully submitted this ____ day of _____, 2019.
- B. Submitted By: _____ (Insert name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).

END OF DOCUMENT 004321

SECTION 004322 - UNIT PRICES FORM

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: Garrett College Community Education and Performing Arts Center.
- C. Project Location: Garrett College, 687 Mosser Road, McHenry, Maryland 20541.
- D. Owner: Garrett College.
- E. Owner Project Number: CC-15-MC17-449.
- F. Architect/Engineer: DLR Group.
- G. Architect Project Number: 56-18107-00.

1.2 BID FORM SUPPLEMENT

- A. This form is required to be attached to the Bid Form.
- B. The undersigned Bidder proposes the amounts below be added to or deducted from the Contract Sum on performance and measurement of the individual items of Work and for adjustment of the quantity given in the Unit-Price Allowance for the actual measurement of individual items of the Work.
- C. If the unit price does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

1.3 UNIT PRICES

- A. Unit-Price No. 1: Furnish and install riprap Class 1.
 - 1. _____ dollars (\$ _____) per unit.
- B. Unit-Price No. 2: Earth excavation-machine and disposal on-site.
 - 1. _____ dollars (\$ _____) per unit.
- C. Unit-Price No. 3: Earth excavation-machine and disposal offsite.
 - 1. _____ dollars (\$ _____) per unit.

- D. Unit-Price No. 4: Earth excavation-hand and disposal on-site.
1. _____ dollars (\$ _____) per unit.
- E. Unit-Price No. 5: Earth excavation-hand and disposal offsite.
1. _____ dollars (\$ _____) per unit.
- F. Unit-Price No. 6: Trench excavation and soil disposal on-site.
1. _____ dollars (\$ _____) per unit.
- G. Unit-Price No. 7: Trench excavation and soil disposal offsite.
1. _____ dollars (\$ _____) per unit.
- H. Unit-Price No. 8: Excavate and legally dispose offsite contaminated soil.
1. _____ dollars (\$ _____) per unit.
- I. Unit-Price No. 9: Rock removal and offsite disposal.
1. _____ dollars (\$ _____) per unit.
- J. Unit-Price No. 10: Unsuitable material excavation and offsite disposal.
1. _____ dollars (\$ _____) per unit.
- K. Unit-Price No. 11: Suitable material import, placement, and compaction.
1. _____ dollars (\$ _____) per unit.
- L. Unit-Price No. 12: Undercut, dispose on-site, and refill with MSHA #2 or #57 stone compact per specified requirements at trench areas only.
1. _____ dollars (\$ _____) per unit.
- M. Unit-Price No. 13: Undercut, dispose offsite, and refill with CR-6 and compact per specified requirements at trench areas only.
1. _____ dollars (\$ _____) per unit.
- N. Unit-Price No. 14: Undercut, dispose on-site, and refill with MSHA #2 or #57 stone compact per specified requirements in open areas only.
1. _____ dollars (\$ _____) per unit.

- O. Unit-Price No. 15: Undercut, dispose offsite, and refill with CR-6 and compact per specified requirements at open areas only.

1. _____ dollars (\$ _____) per unit.

1.4 SUBMISSION OF BID SUPPLEMENT

- A. Respectfully submitted this ____ day of _____, 2019.
- B. Submitted By: _____ (Insert name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).

END OF DOCUMENT 004322

SECTION 004323 - ALTERNATES FORM

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: Garrett College Community Education and Performing Arts Center.
- C. Project Location: Garrett College, 687 Mosser Road, McHenry, Maryland 21541.
- D. Owner: Garrett College.
- E. Owner Project Number: CC-15-MC17-449.
- F. Architect/Engineer: DLR Group.
- G. Architect Project Number: 56-18107-00.

1.2 BID FORM SUPPLEMENT

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

1.3 DESCRIPTION

- A. The undersigned Bidder proposes the amount below be added to or deducted from the Base Bid if particular alternates are accepted by Owner. Amounts listed for each alternate include costs of related coordination, modification, or adjustment.
 - 1. Cost-Plus-Fee Contract: Alternate price given below includes adjustment to Contractor's Fee.
- B. If the alternate does not affect the Contract Sum, the Bidder shall indicate "NO CHANGE."
- C. If the alternate does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."
- D. The Bidder shall be responsible for determining from the Contract Documents the affects of each alternate on the Contract Time and the Contract Sum.
- E. Owner reserves the right to accept or reject any alternate, in any order, and to award or amend the Contract accordingly within [60] days of the Notice of Award unless otherwise indicated in the Contract Documents.

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

1.4 SCHEDULE OF ALTERNATES

- A. General: Refer to Drawings and Specification Section 012300 "Alternates" for information on Alternates.

- B. Alternate No. 1: Paved Sidewalk, Amphitheater Stage, and Amphitheater Electrical:

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

- C. Alternate No. 2: Accent Lighting:

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

- D. Alternate No. 3: Theatrical Alternate:

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

- E. Alternate No. 4: AV Alternate:

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

1.5 SUBMISSION OF BID SUPPLEMENT

- A. Respectfully submitted this ____ day of _____, 2019.
- B. Submitted By: _____ (Name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).

END OF DOCUMENT 004323

DRAFT AIA® Document A101™ - 2017

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

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

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

Garrett College
687 Mosser Road
McHenry, Maryland
21541

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

« »« »
« »
« »
« »

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

Garrett College Community Education and Performing Arts Center (CEPAC)
Garrett College
687 Mosser Road, McHenry, Maryland 21541

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

DLR Group of DC, P.C.
419 7th Street, NW
Second Floor
Washington, DC 20004

The Owner and Contractor agree as follows.

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

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

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

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TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS
- 2 THE WORK OF THIS CONTRACT
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
- 4 CONTRACT SUM
- 5 PAYMENTS
- 6 DISPUTE RESOLUTION
- 7 TERMINATION OR SUSPENSION
- 8 MISCELLANEOUS PROVISIONS
- 9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

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

- The date of this Agreement.
- A date set forth in a notice to proceed issued by the Owner.
- Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

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

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

§ 3.3 Substantial Completion

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

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

[« »] By the following date: « »

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

Portion of Work	Substantial Completion Date

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

3.3.4 The Contractor shall achieve Final Completion of the entire work not later than sixty (60) calendar days after Substantial Completion.

ARTICLE 4 CONTRACT SUM

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

§ 4.2 Alternates

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

Item	Price

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

Item	Price	Conditions for Acceptance

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

Item	Price

§ 4.4 Unit prices, if any:

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

Item	Units and Limitations	Price per Unit (\$0.00)

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

« »

§ 4.6 Other:

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

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

« »

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

(Federal, state or local laws may require payment within a certain period of time.)

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

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

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

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

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

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

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

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

10%

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

<< >>

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

Retainage will be reduced to 5% at Substantial Completion. No further reduction in Retainage shall be made until all Punch List work is completed.

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

<< >>

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

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

§ 5.2 Final Payment

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

- .1 the Contractor has fully performed the Contract except for the Contractor’s responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

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

<< >>

§ 5.3 Interest

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

(Insert rate of interest agreed upon, if any.)

<< >> % << >>

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

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

<< >>

<< >>

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<< >>

§ 6.2 Binding Dispute Resolution

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

(Check the appropriate box.)

Arbitration pursuant to Section 15.4 of AIA Document A201–2017

Litigation in a court of competent jurisdiction.

Other *(Specify)*

<< >>

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

ARTICLE 7 TERMINATION OR SUSPENSION

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

§ 7.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner’s convenience.)

<< >>

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

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

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

<< >>
<< >>
<< >>
<< >>
<< >>
<< >>
<< >>

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

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<< >>

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

§ 8.5 Insurance and Bonds

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

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

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201-2017, may be given in accordance with AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203-2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

<< >>

§ 8.7 Other provisions:

<< >>

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™-2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™-2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

(Insert the date of the E203-2013 incorporated into this Agreement.)

<< >>

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

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

.8 Other Exhibits:

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

[<< >>] AIA Document E204™-2017, Sustainable Projects Exhibit, dated as indicated below:

(Insert the date of the E204-2017 incorporated into this Agreement.)

<< >>

[<< >>] The Sustainability Plan:

Title	Date	Pages

[<< >>] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents, if any, listed below:

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

<< >>

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

OWNER (Signature)

<< >><< >>

(Printed name and title)

CONTRACTOR (Signature)

<< >><< >>

(Printed name and title)

DRAFT AIA® Document A312™ - 2010

Payment Bond

CONTRACTOR:

(Name, legal status and address)

« »
« »

SURETY:

(Name, legal status and principal place of business)

« »
« »

OWNER:

(Name, legal status and address)

Garrett College
687 Mosser Road
McHenry, Maryland 21541

CONSTRUCTION CONTRACT

Date: « »

Amount: \$ « »

Description:

(Name and location)

Garrett College Community Education and Performing Arts Center
Garrett College
687 Mosser Road
McHenry, Maryland 21541

BOND

Date:

(Not earlier than Construction Contract Date)

« »

Amount: \$ « »

Modifications to this Bond:

« »

None

« »

See Section
18

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

SURETY

Company: (Corporate Seal)

Signature:

Name and « »
« »

Title:

Signature:

Name and « »
« »

Title:

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

« »
« »
« »

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

Garrett College
687 Mosser Road
McHenry, Maryland 21541

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

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

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: _____ (Corporate Seal)

Signature: _____
Name and Title: « »« »
Address: « »

SURETY

Company: _____ (Corporate Seal)

Signature: _____
Name and Title: « »« »
Address: « »

DRAFT AIA® Document A312™ - 2010

Performance Bond

CONTRACTOR:

(Name, legal status and address)

« »« »
« »

SURETY:

(Name, legal status and principal
place of business)

« »« »
« »

OWNER:

(Name, legal status and address)

Garrett College
687 Mosser Road
McHenry, Maryland 21541

CONSTRUCTION CONTRACT

Date: « »

Amount: \$ « »

Description:

(Name and location)

Garrett College Community Education and Performing Arts Center
Garrett College
687 Mosser Road
McHenry, Maryland 21541

BOND

Date:

(Not earlier than Construction Contract Date)

« »

Amount: \$ « »

Modifications to this

Bond:

None

See Section 16

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

Signature:

Name and « »« »

Title:

SURETY

Company: (Corporate Seal)

Signature:

Name and « »« »

Title:

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

« »
« »
« »

OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

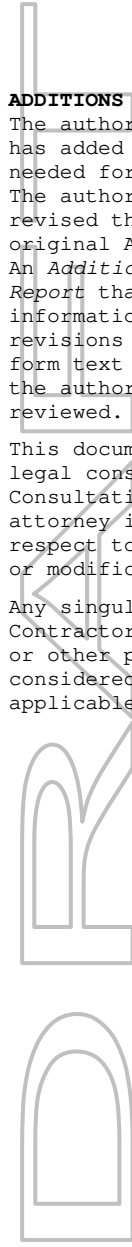
Garrett College
687 Mosser Road
McHenry, Maryland 21541

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.

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Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.



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§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to

the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 14.1 **Balance of the Contract Price.** The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 **Construction Contract.** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 **Contractor Default.** Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

Signature:

Name and Title: « »« »

Address: « »

SURETY

Company: (Corporate Seal)

Signature:

Name and Title: « »« »

Address: « »

Bid Bond

CONTRACTOR:

(Name, legal status and address)

« »« »
« »

SURETY:

(Name, legal status and principal place of business)

« »« »
« »

OWNER:

(Name, legal status and address)

Garrett College
687 Mosser Road
McHenry, Maryland 21541

BOND AMOUNT: \$ « »

PROJECT:

(Name, location or address, and Project number, if any)

Garrett College Community Education and Performing Arts Center
Garrett College
687 Mosser Road
McHenry, Maryland 21541

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so

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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.

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Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

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furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this « » day of « », « »

(Witness)

(Witness)

« »

(Contractor as Principal) (Seal)

« »

(Title)

« »

(Surety) (Seal)

« »

(Title)



DRAFT AIA® Document A201™ – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Garrett College Community Education and Performing Arts Center (CEPAC)
Garrett College
687 Mosser Road
McHenry, Maryland 21541

THE OWNER:

(Name, legal status and address)

Garrett College
687 Mosser Road
McHenry, Maryland 21541

THE ARCHITECT:

(Name, legal status and address)

DLR Group of DC, P.C.
419 7th Street NW
Second Floor
Washington, DC 20004

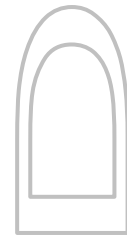
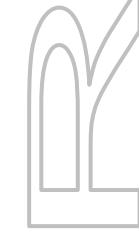
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- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS

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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

- .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 007300 – SUPPLEMENTARY GENERAL CONDITIONS

1.1 GENERAL

- A. The following supplements modify, change, delete from or add to the “General Conditions of the Contract for Construction (AIA Document A201-2017). Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered provisions of the General Conditions shall remain in effect.

1.2 ARTICLE 7 CHANGES IN THE WORK

- A. Add the following:

“7.1.4 Allowable Overhead and Profit on Changes in the Work

7.1.4.1 For the Contractor, for Work performed by the Contractor’s own forces, the combined overhead and profit shall be based on the following schedule:

<u>Value of Work</u>	<u>Combined Overhead and Profit</u>
\$0 - \$1,000	15 percent
\$1,001 - \$5,000	10 percent
\$5,001 - \$10,000	8 percent
\$10,001 - \$25,000	5 percent
Over \$25,000	Negotiated, but not more than 5 percent.

7.1.4.2 For the Contractor, for Work performed by the Contractor’s Subcontractor, the overhead and profit allowance shall be 3 percent of the amount due the Subcontractor.

7.1.4.3 For each Subcontractor involved, for Work performed by that Subcontractor’s own forces, the combined overhead and profit allowance shall be based on the same schedule above.

7.1.4.4 In order to facilitate checking quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs, including labor, materials, and Subcontracts. Labor and materials shall be itemized in the manner described above. Where major cost items are Subcontracts, they shall be itemized also. In no case will a change be approved without such itemization. The Contractor shall not be allowed to add costs to any change for additional superintendent or project manager’s time.”

- B. Add the following:

“7.1.5 The Owner may initiate the change order procedure by issuing a request for proposal to the Contractor. The Contractor shall, within the time period stated in the request for proposal, submit to the Owner and Architect for evaluation detailed information concerning the cost and time adjustments, if any, as may be necessary to perform the proposed change order work.”

1.3 ARTICLE 9 PAYMENTS AND COMPLETION

A. Add the following:

“9.11 Liquidated Damages

9.11.1 The Contractor acknowledges that ‘Time is of the Essence’ and agrees that the Work must be Substantially Complete with all building systems fully operational and an Occupancy Permit obtained no later than the proposing Contractor’s **Proposed Date of Substantial Completion** and the Work must be Finally Complete no later than sixty (60) days after the Substantial Completion date (the ‘Final Complete date’.)

The Contractor agrees that the Owner shall retain One Thousand, Six Hundred Dollars (\$1,600) from the amount of compensation to be paid the Contractor for each calendar day after the scheduled date for Substantial Completion. Once Substantial Completion is achieved, the sum of Five Hundred Dollars (\$500) shall be retained for each day past 60 days from the actual Substantial Completion date that it takes the Contractor to achieve Final Completion.

The Contractor acknowledges and agrees that the Owner has established this liquidated damages system and selected the liquidated damages amounts as the proper measure of damages which the Owner will suffer and incur per day by the failure of the Contractor to complete the Work by the agreed Contract Time and established Substantially Complete Date.

The Contractor and the Contractor’s surety stipulate that these liquidated damages provisions are reasonable, valid, and enforceable and waive any right to claim otherwise and waives any defense as to the validity of any liquidated damages stated herein as they may appear on the grounds that such liquidated damages are void as penalties or are not reasonably related to actual damages. The Contractor and the Owner agree that this provision and these requirements are not to be construed as a penalty but instead these requirements are an attempt to fairly compensate Owner for the substantial consequential damages which the Owner will suffer if the Contractor fails to perform by the Contract Time and dates established hereunder which damages are difficult to determine using standard contract damages methods. The liquidated damages requirements shall be an exception to any waiver or other elimination of the Owner’s right to recover consequential damages. The Contractor acknowledges that Owner would not enter into a contract with the Contractor for the Work without the inclusion of these liquidated damages requirements.

9.11.2 In addition to Liquidated Damages, the Contractor shall pay to the Owner the cost of those extended services incurred by the Owner (including Architect), beginning at 61 days from the date of Substantial Completion required by the Contract and until Final Completion is achieved.”

END OF SUPPLEMENTARY GENERAL CONDITIONS



STATE OF MARYLAND

DEPARTMENT OF LABOR, LICENSING AND REGULATION
DIVISION OF LABOR AND INDUSTRY
PREVAILING WAGE SECTION
1100 N. Eutaw Street, Room 607
Baltimore, MD 21201
(410) 767-2342

08/23/2019

REQUEST FOR ADVERTISEMENT AND NOTICE TO PROCEED

Kathleen Meagher - Procurement Officer
Garrett College
687 Mosser Rd
McHenry, MD 21541

Re: Garrett College-Community Education and Performing Arts
Project No: CC-15-MC17-449

Enclosed please find the Prevailing Wage Determination and Instructions for Contractors for the project referenced above.

Upon advertisement for bid or proposal of this project, you are requested to submit to this office the date and name of publication in which such advertisement appeared.

Once awarded, you are further directed to submit to this office, the NOTICE TO PROCEED for the project, complete with the date of notice, the name of the general contractor, and the dollar amount of the project. In addition, we ask that a representative of the prevailing wage Unit be invited to attend the Pre-Construction Conference.

Any questions concerning this matter may be referred to PrevailingWage@dllr.state.md.us

Sincerely,

Enclosures
Wage Determination
Instruction for the Contractor

Prevailing Wage Unit

PREVAILING WAGE INSTRUCTIONS FOR THE CONTRACTOR & SUBCONTRACTOR

The contractor shall electronically submit completed copies of certified payroll records to the Commissioner of Labor & Industry, Prevailing Wage Unit by going on-line to <https://www.dllr.state.md.us/prevwage> and following the instructions for submitting payroll information (NOTE: A contractor must register prior to submitting on-line certified payroll information).

If you have technical questions regarding electronic submittal, contact the Department at dldlprevailingwage-dllr@maryland.gov.

All certified payroll records shall have an accurate week beginning and ending date. The contractor shall be responsible for certifying and submitting to the Commissioner of Labor and Industry, Prevailing Wage Unit all of their subcontractors' payroll records covering work performed directly at the work site. By certifying the payroll records, the contractor is attesting to the fact that the wage rates contained in the payroll records are not less than those established by the Commissioner as set forth in the contract, the classification set forth for each worker or apprentice conforms with the work performed, and the contractor or subcontractor has complied with the provisions of the law.

A contractor or subcontractor may make deductions that are (1) required by law; (2) required by a collective bargaining agreement between a bona fide labor organization and the contractor or subcontractor; or (3) contained in a written agreement between an employee and an employer undertaken at the beginning of employment, if the agreement is submitted by the employer to the public body awarding the public work and is approved by the public body as fair and reasonable.

A contractor or subcontractor is required to submit information on-line on their fringe benefit packages including a list of fringe benefits for each craft employed by the contractor or subcontractor, by benefit and hourly amount. Where fringe benefits are paid in cash to the employee or to an approved plan, fund, or program, the contribution is required to be indicated.

Payroll records must be electronically submitted and received within 14 calendar days after the end of each payroll period. If the contractor is delinquent in submitting payroll records, processing of partial payment estimates may be held in abeyance pending receipt of the records. In addition, if the contractor is delinquent in submitting the payroll records, the contractor shall be liable to the contracting public body for liquidated damages. The liquidated damages are \$10.00 for each calendar day the records are late.

Only apprentices registered with the Maryland Apprenticeship and Training Council shall be employed on prevailing wage projects. Apprentices shall be paid a percentage of the determined journey person's wage for the specific craft.

Overtime rates shall be paid by the contractor and any subcontractors under its contracts and agreements with their employees which in no event shall be less than time and one-half the prevailing hourly rate of wages for all hours worked in excess of ten (10) hours in any one calendar day; in excess of forty (40) hours per workweek; and work performed on Sundays and legal holidays.

Contractors and subcontractors employing a classification of worker for which a wage rate was not issued SHALL notify the Commissioner of Labor & Industry, Prevailing Wage Unit, for the purpose of obtaining the wage rate for said classification PRIOR TO BEING EMPLOYED on the project. To obtain a prevailing wage rate which was NOT listed on the Wage Determination, a contractor or subcontractor can look on the DLLR webpage under prevailing wage.

Contractors and subcontractors shall maintain a valid copy of proper State and county licenses that permit the contractor and a subcontractor to perform construction work in the State of Maryland. These licenses must be retained at the worksite and available for review upon request by the Commissioner of Labor and Industry's designee.

****Each contractor under a public work contract subject to Section 17-219 shall:**

1. Post a clearly legible statement of each prevailing wage rate to be paid under the public work contract; and
2. Keep the statement posted during the full time that any employee is employed on the public work contract.
3. The statement of prevailing wage rates shall be posted in a prominent and easily accessible place at the site of the public work.

****Penalty - Subject to Section 10-1001 of the State Government Article, the Commissioner may impose on a**

person that violates this section a civil penalty of up to \$50.00 per violation.

Under the Maryland Apprenticeship and Training Council requirements, consistent with proper supervision, training and continuity of employment and applicable provisions in collective bargaining agreements, a ratio of one journey person regularly employed to one apprentice shall be allowed. No deviation from this ratio shall be permitted without prior written approval from the Maryland Apprenticeship and Training Council.

Laborers may NOT assist mechanics in the performance of the mechanic's work, NOR USE TOOLS peculiar to established trades.

ALL contractors and subcontractors shall employ only competent workers and apprentices and may NOT employ any individual classified as a HELPER or TRAINEE on a prevailing wage project.

The State Apprenticeship and Training Fund (Fund) law provides that contractors and certain subcontractors performing work on certain public work contracts are required to make contributions toward apprenticeship. See §17-601 through 17-606, State Finance and Procurement, Annotated Code of Maryland. Contractors and subcontractors have three options where they can choose to make their contributions: (1) participate in a registered apprenticeship training program; (2) contribute to an organization that has a registered apprenticeship training program; or (3) contribute to the State Apprenticeship and Training Fund.

The Department of Labor, Licensing and Regulation (DLLR) is moving forward with final adoption of regulations. The regulations were published in the December 14, 2012 edition of the Maryland Register.

IMPORTANT: Please note that the obligations under this law will become effective on JULY1, 2013. This law will require that contractors and certain subcontractors make contributions toward apprenticeship and report those contributions on their certified payroll records that they submit pursuant to the prevailing wage law.

The Department is offering outreach seminars to any interested parties including contractors, trade associations, and any other stakeholders. Please contact the Department at dldlprevailingwage-dllr@maryland.gov or (410) 767-2968 for seminar times and locations. In addition, information regarding this law will be provided at pre-construction meetings for projects covered by the Prevailing Wage law.

**For additional information, contact:
Division of Labor and Industry
Maryland Apprenticeship and Training
1100 North Eutaw Street, Room 606
Baltimore, Maryland 21201
(410) 767-2246
E-Mail Address: matp@dllr.state.md.us.**

STATE OF MARYLAND

DEPARTMENT OF LABOR, LICENSING AND REGULATION
DIVISION OF LABOR AND INDUSTRY
PREVAILING WAGE SECTION
1100 N. Eutaw Street, Room 607
Baltimore, MD 21201
(410) 767-2342

The wage rates to be paid laborers and mechanics for the locality described below is announced by order of Commissioner of Labor and Industry.

It is mandatory upon the successful bidder and any subcontractor under him, to pay not less than the specific rates to all workers employed by them in executing contracts in this locality. Reference: Annotated Code of Maryland State Finance and Procurement, Section 17-201 thru 17-226.

These wage rates were taken from the locality survey of 2018 for Garrett County, issued pursuant to the Commissioner's authority under State Finance and Procurement Article Section 17-209, Annotated Code of Maryland or subsequent modification.

**Note: If additional Prevailing Wage Rates are needed for this project beyond those listed below, contact the Prevailing Wage Unit. Phone: (410) 767-2342, email: prevailingwage@dllr.state.md.us.

Name and Title of Requesting Officer: Kathleen Meagher - Procurement Officer

Department, Agency or Bureau: Garrett College
687 Mosser Rd McHenry, MD 21541

Project Number
CC-15-MC17-449

Determination Number
42279

Location and Description of work:

Garrett County: Renovate the 800 Building (11k GSF) on Garrett College's main campus & build a #k GSF addition (16k GSF) to create the Community Education & Performing Arts Center

Date of Issue: Aug 23, 2019

BUILDING CONSTRUCTION

Table with 5 columns: CLASSIFICATION, MODIFICATION REASON, BASIC HOURLY RATE, BORROWED FROM, FRINGE BENEFIT PAYMENT. Rows include BALANCING TECHNICIAN, BRICKLAYER, BRICKLAYER/SAWMAN, CARPENTER, CARPET LAYER, COMMUNICATION INSTALLER TECHNICIAN, DRYWALL - SPACKLING, TAPING, & FINISHING, ELECTRICIAN, ELEVATOR MECHANIC, FIREPROOFER - BY HAND, FIREPROOFER - SPRAYER.

GLAZIER	AD	\$23.76	001	\$7.98
INSULATION WORKER	AD	\$35.26		\$24.80
IRONWORKER - REINFORCING	AD	\$27.06	001	\$20.83
IRONWORKER - STRUCTURAL	AD	\$27.06		\$20.83
MILLWRIGHT	AD	\$30.92	001	\$17.50
PAINTER	AD	\$18.50	001	\$7.98
PLUMBER	AD	\$33.18		\$14.18
POWER EQUIPMENT OPERATOR - ASPHALT DISTRIBUTOR	AD	\$33.37		\$13.95
POWER EQUIPMENT OPERATOR - BACKHOE	AD	\$32.77		\$13.95
POWER EQUIPMENT OPERATOR - BULLDOZER	AD	\$32.77	001	\$13.95
POWER EQUIPMENT OPERATOR - CONCRETE PUMP	AD	\$32.22	001	\$13.95
POWER EQUIPMENT OPERATOR - CRANE	AD	\$33.37		\$13.95
POWER EQUIPMENT OPERATOR - EXCAVATOR	AD	\$32.77		\$13.95
POWER EQUIPMENT OPERATOR - FORKLIFT	AD	\$32.77		\$13.95
POWER EQUIPMENT OPERATOR - GRADER	AD	\$32.77	001	\$13.95
POWER EQUIPMENT OPERATOR - HOIST	AD	\$33.37	001	\$13.95
POWER EQUIPMENT OPERATOR - LOADER	AD	\$32.77		\$13.95
POWER EQUIPMENT OPERATOR - MECHANIC	AD	\$32.77	001	\$13.95
POWER EQUIPMENT OPERATOR - OILER	AD	\$32.22	001	\$13.95
POWER EQUIPMENT OPERATOR - PAVER	AD	\$27.72	001	\$13.40
POWER EQUIPMENT OPERATOR - ROLLER - ASPHALT	AD	\$27.72	001	\$13.40
POWER EQUIPMENT OPERATOR - ROLLER - EARTH	AD	\$28.87	001	\$13.40
POWER EQUIPMENT OPERATOR - SCREED	AD	\$28.97		\$13.62
POWER EQUIPMENT OPERATOR - SKID STEER (BOBCAT)	AD	\$32.77		\$13.95
POWER EQUIPMENT OPERATOR - SKIDDER	AD	\$28.27	001	\$13.40
POWER EQUIPMENT OPERATOR - TRENCHER	AD	\$32.77	001	\$13.95
ROOFER/WATERPROOFER	AD	\$30.00	001	\$12.15
SHEETMETAL WORKER	AD	\$25.47		\$21.89
SPRINKLERFITTER	AD	\$36.77	001	\$19.34
STEAMFITTER/PIPEFITTER	AD	\$33.18		\$14.18
STONE MASON	AD	\$37.91	043	\$17.79
TILE & TERRAZZO FINISHER	AD	\$23.28	001	\$11.19
TILE & TERRAZZO MECHANIC	AD	\$28.20	001	\$12.23
TRUCK DRIVER - DUMP	AD	\$24.82	001	\$13.10
TRUCK DRIVER - TACK/TAR TRUCK	AD	\$19.84		\$4.70
TRUCK DRIVER - TANDEM	AD	\$21.99	001	\$8.10

LABORER GROUP II

LABORER - ASPHALT RAKER	AD	\$20.71		\$19.80
LABORER - COMMON	AD	\$20.71		\$19.80
LABORER - CONCRETE PUDDLER	AD	\$20.71		\$19.80
LABORER - CONCRETE TENDER	AD	\$20.71		\$19.80
LABORER - CONCRETE VIBRATOR	AD	\$20.71		\$19.80
LABORER - DENSITY GAUGE	AD	\$20.71		\$19.80
LABORER - FIREPROOFER - MIXER	AD	\$20.71		\$19.80
LABORER - FLAGGER	AD	\$20.71		\$19.80
LABORER - GRADE CHECKER	AD	\$20.71		\$19.80

LABORER - HAND ROLLER	AD	\$20.71		\$19.80
LABORER - JACKHAMMER	AD	\$20.71		\$19.80
LABORER - LANDSCAPING	AD	\$20.71		\$19.80
LABORER - LAYOUT	AD	\$20.71		\$19.80
LABORER - LUTEMAN	AD	\$20.71		\$19.80
LABORER - MORTAR MIXER	AD	\$20.71		\$19.80
LABORER - PLASTERER - HANDLER	AD	\$20.71		\$19.80
LABORER - TAMPER	AD	\$20.71		\$19.80

LABORERS GROUP I				
LABORER - AIR TOOL OPERATOR	AD	\$20.89	001	\$19.80
LABORER - ASPHALT PAVER	AD	\$20.89	001	\$19.80
LABORER - BLASTER - DYNAMITE	AD	\$20.89	001	\$19.80
LABORER - BURNER	AD	\$20.89	001	\$19.80
LABORER - CONCRETE SURFACER	AD	\$20.89	001	\$19.80
LABORER - HAZARDOUS MATERIAL HANDLER	AD	\$20.89	001	\$19.80
LABORER - MASON TENDER	AD	\$20.89	001	\$19.80
LABORER - PIPELAYER	AD	\$20.89	001	\$19.80
LABORER - SCAFFOLD BUILDER	AD	\$20.89	001	\$19.80

FRINGE REFERENCES AS NOTED:

- a. PAID HOLIDAYS: New Year Day, Memorial Day, July4th, Labor Day, Thanksgiving Day & Christmas Day.
- b. PAID VACATIONS: Employees with 1 year service - 1 week paid vacation;
2 years service - 2 weeks paid vacation;
10 years service - 3 weeks paid vacation.

Incidental Craft Data: Caulker, Man Lift Operator, Rigger, Scaffold Builder, and Welder receive the wage and fringe rates prescribed for the craft performing the operation to which welding, scaffold building, rigging, operating a Man Lift, or caulking is incidental.

These **Informational Prevailing Wage Rates** may not be substituted for the requirements of pre-advertisement or onsite job posting for a public work contract that exceeds \$500,000 in value and either of the following criteria are met: (1) the contracting body is a unit of State government or an instrumentality of the State and there is any State funding for the project; or (2) the contracting body is a political subdivision, agency, person or entity (such as a county) and the State funds 50% or more of the project.

Modification Codes:

- (AD) 17-209 Annual Determination from Survey Wage Data Received
- (CH) 17-211 Commissioners' Hearing
- (CR) 17-208 Commissioners' Review
- (SR) 17-208 Survey Review by Staff

Each "Borrowed From" county is identified with the FIPS 3-digit county code unique for the specific jurisdiction in Maryland.

For additional information on the FIPS (Federal Information Processing Standard) code, see <http://www.census.gov/datamap/fipslist/AllSt.txt>

The Prevailing Wage rates appearing on this form were originally derived from Maryland's annual Wage Survey. The Commissioner of Labor & Industry encourages all contractors and interested groups to participate in the voluntary Wage Survey, detailing wage rates paid to workers on various types of construction throughout Maryland.

A mail list of both street and email addresses is maintained by the Prevailing Wage Unit to enable up-to-date prevailing wage information, including Wage Survey notices to be sent to contractors and other interested parties. If you would like to be included in the mailing list, please forward (1) your Name, (2) the name of your company (if applicable), (3) your complete postal mailing address, (4) your email address and (5) your telephone number to PWMAILINGLIST@dllr.state.md.us. Requests for inclusion can also be mailed to: Prevailing Wage, 1100 N. Eutaw Street - Room 607, Baltimore MD 21201-2201.

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Owner-furnished/Contractor-installed (OFICI) products.
 - 4. Contractor's use of site and premises.
 - 5. Coordination with occupants.
 - 6. Work restrictions.
 - 7. Specification and Drawing conventions.
- B. Related Requirements:
 - 1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
 - 2. Section 017300 "Execution" for coordination of Owner-installed products.
 - 3. Section 003126 "Existing Hazardous Material Information" and Hazardous Material specifications, surveys, and reports included in the Project Manual.

1.3 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

- A. Project Identification: Garrett College Community Education and Performing Arts Center (CEPAC), Project No. CC-15-MC17-449.
 - 1. Project Location: 687 Mosser Road, McHenry, Maryland 21541.
- B. Owner: Garrett College, 687 Mosser Road, McHenry, Maryland 21541.
 - 1. Owner's Representative: Kathleen (Kathy) Meagher, Director of Campus Facilities, Garrett College, 687 Mosser Road, McHenry, Maryland 21541 (301) 387-3095, kathy.meagher@garrettcollege.edu.

- C. Architect/Engineer: DLR Group of DC, P.C., 419 7th Street NW, 2nd Floor, Washington, DC 20004.
 - 1. Architect/Engineer's Representative: Scott Cryer, AIA, 419 7th Street NW, 2nd Floor, Washington, DC 20004 (202) 393-6445, scryer@DLRgroup.com.

- D. Architect/Engineer's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:
 - 1. Structural Engineering: Carroll Engineering.
 - a. Structural Engineering Representative: Mark Hood, P.E., Carroll Engineering, Inc., 215 Schilling Circle, Suite 102, Hunt Valley, Maryland 21031 (410) 785-7423, mhood@ceiengineering.com.
 - 2. Civil Engineering: Carroll Engineering, Inc.
 - a. Civil Engineering Representative: Fred Petty, Carroll Engineering, Inc., 215 Schilling Circle, Suite 102, Hunt Valley, Maryland 21031 (410) 785-7423, fpetty@ceiengineering.com.
 - 3. Landscape Architecture: Carroll Engineering, Inc.
 - a. Landscape Architect Representative: Claire Fishman, P.L.A., Carroll Engineering, Inc., 215 Schilling Circle, Suite 102, Hunt Valley, Maryland 21031 (410) 785-7423, cfishman@ceiengineering.com.
 - 4. Land Surveyor: Century Engineering, Inc.
 - a. Century Engineering, 10710 Gilroy Road, Hunt Valley, Maryland 21031 (443) 589-2400.

- E. Other Owner Consultants: Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:
 - 1. Commissioning Agent:
 - a. Commissioning Agent Representative: Daniel Loizeaux, P.E., CxA, KCI Technologies, Inc. (717) 516-7627.
 - b. Scope of Service: Project Commissioning Agent.
 - 2. Hazardous Materials Consultant:
 - a. Boggs Environmental Consultants, (301) 694-5687.
 - b. Scope of Service: Hazardous Material Reports and Construction Documentation.

- F. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.
 - 1. See Section 013100 "Project Management and Coordination." for requirements for using web-based Project software.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
 - 1. Situated at the entrance of Garrett College campus, the new Community Education and Performing Arts Center (CEPAC) will provide a new performance venue that will help develop a new performance venue that will augment an already rich arts culture at the campus and in the community. The new CEPAC will address needs of the college, local public schools, and organizations including the Garrett Lakes Arts Festival.

2. The existing Garrett College gym's footprint (8,000 SF) will be renovated to incorporate a new proscenium stage, shallow orchestra pit, and flexible auditorium with seating for up to 485 occupants including wheelchair spaces and additional space for standing patrons; an existing auxiliary space (1,470 SF) will house a piano lab and mechanical space; and an addition (16,800 SF) will house faculty offices, public restrooms, lobby space, theater support spaces including dressing rooms, toilet rooms, climate-controlled piano storage, general storage, and additional mechanical and electrical spaces. The addition will also include a flexible, sub-divisible multipurpose space that allows the Center to meet the needs of different user groups, creating meeting rooms that function as classrooms and rehearsal spaces that can transition into a large black box space.
3. Work of Project includes Civil, Landscape, Mechanical, Electrical, Lighting, Plumbing Fire Protection, Telecommunications, Audio Visual, Theatrical, Interior Finishes, and Work indicated in the Contract Documents for a complete project.

B. Type of Contract:

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

1.6 OWNER-FURNISHED/CONTRACTOR-INSTALLED (OFCI) PRODUCTS

A. Owner's Responsibilities: Owner will furnish products indicated and perform the following, as applicable:

1. Provide to Contractor Owner-reviewed Product Data, Shop Drawings, and Samples.
2. Provide for delivery of Owner-furnished products to Project site.
3. Upon delivery, inspect, with Contractor present, delivered items.
 - a. If Owner-furnished products are damaged, defective, or missing, arrange for replacement.
4. Obtain manufacturer's inspections, service, and warranties.
5. Inform Contractor of earliest available delivery date for Owner-furnished products.

B. Contractor's Responsibilities: The Work includes the following, as applicable:

1. Designate delivery dates of Owner-furnished products in Contractor's construction schedule, utilizing Owner-furnished earliest available delivery dates.
2. Review Owner-reviewed Product Data, Shop Drawings, and Samples, noting discrepancies and other issues in providing for Owner-furnished products in the Work.
3. Receive, unload, handle, store, protect, and install Owner-furnished products.
4. Make building services connections for Owner-furnished products.
5. Protect Owner-furnished products from damage during storage, handling, and installation and prior to Substantial Completion.
6. Repair or replace Owner-furnished products damaged following receipt.
7. Contractor is responsible for sealing around penetrations, roof tie-ins, connections to building envelope and similar for a continuous seal. Contractor is to minimize thermal bridging.

C. Owner-Furnished/Contractor-Installed (OFCI) Products:

1. Select Toilet Room Accessories as indicated in Section 102800 "Toilet Accessories" and on the Drawings as being provided by Owner.

1.7 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways parking areas, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.8 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.9 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 8:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if notified in advance and approved by Owner and authorities having jurisdiction.

1. Weekend Hours: 7:00 a.m. to 8:00 p.m. if approved in advance by Owner. Contractor shall not do any work on Saturdays or Sundays that require County or third-party inspections or testing without advanced notice and approval of the College and the applicable inspection entity.
 2. Hours for Utility Shutdowns: Coordinate with Owner in advance and obtain approval prior to shutdown when buildings outside of construction are affected.
 3. Hours for Core Drilling and other High Noise Level Activities: As approved in advance by Owner.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
1. Notify Owner not less than five working days in advance of proposed utility interruptions.
 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
1. Notify Owner not less than five days in advance of proposed disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances within the existing building, on Project site, and on Owner's property 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.
- G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
1. Maintain list of approved screened personnel with Owner's representative.
- 1.10 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. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. 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 scheduled on Drawings and published as part of the U.S. National CAD Standard.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Contingency allowances.
 - 3. Unit cost allowances.
- C. Related Requirements:
 - 1. Section 012200 "Unit Prices" for procedures for using unit prices, including adjustment of quantity allowances when applicable.
 - 2. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 3. Section 014000 "Quality Requirements" for procedures governing the use of allowances for field testing by an independent testing agency.

1.3 DEFINITIONS

- A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection, or purchase and delivery, of each product or system described by an allowance must be completed by the Owner to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

- C. Purchase products and systems selected by Architect from the designated supplier.

1.5 ACTION SUBMITTALS

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

1.6 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.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM 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 ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect or Owner for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include products, delivery, installation, labor insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

ALLOWANCES

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- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit.
- D. Funds will be drawn from the Contingency Allowance only with Owner's advance review and approval and only by Change Order.
- E. At closeout of Contract, funds remaining in Contingency Allowance will be credited to Owner by Change Order.

1.9 UNIT-COST 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 ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1.10 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, required maintenance materials, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
 - 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs due to a change in the scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.

2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

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: Lump-Sum Allowance: Include the sum of \$25,000.00 for the building permit and utility company fees.
 1. This allowance includes material, receiving, handling, and installation costs, and Contractor overhead and profit.
- B. Allowance No. 2: Contingency Allowance: Include a contingency allowance of \$100,000.00 for use according to Owner's written instructions.
- C. Allowance No. 3: Unit Cost Allowance: Permanent Keyed Locking Cores: Include \$120.00 material cost for each keyed core required under the project for permanent keyed core cylinders. Installation is not included in Unit Cost Allowance and is provided under Section 08 "Door Hardware" base bid package.

END OF SECTION 012100

ALLOWANCES

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SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for procedures for using unit prices to adjust quantity allowances.
 - 2. Section 014000 "Quality Requirements" for field testing by an independent testing agency.

1.3 DEFINITIONS

- A. Unit price is an amount incorporated into 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.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections 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 acceptable to Contractor.

- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the Part 3 "Schedule of Unit Prices" Article 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: Furnish and install riprap Class 1.
1. Unit of Measurement: Ton.
- B. Unit Price No. 2: Earth excavation-machine and disposal on-site.
1. Unit of Measurement: Cubic yard.
- C. Unit Price No. 3: Earth excavation-machine and disposal offsite.
1. Unit of Measurement: Cubic yard.
- D. Unit Price No. 4: Earth excavation-hand and disposal on-site.
1. Unit of Measurement: Cubic yard.
- E. Unit Price No. 5: Earth excavation-hand and disposal offsite.
1. Unit of Measurement: Cubic yard.
- F. Unit Price No. 6: Trench excavation and soil disposal on-site.
1. Unit of Measurement: Unit of Measurement: Cubic yard.
- G. Unit Price No. 7: Trench excavation and soil disposal offsite.
1. Unit of Measurement: Unit of Measurement: Cubic yard.
- H. Unit Price No. 8: Excavate and legally dispose offsite contaminated soil.
1. Unit of Measurement: Unit of Measurement: Cubic yard.
- I. Unit Price No. 9: Rock Removal and Offsite Disposal.
1. Unit of Measurement: Unit of Measurement: Cubic yard.
- J. Unit Price No. 10: Unsuitable Material Excavation and Offsite Disposal.
1. Unit of Measurement: Unit of Measurement: Cubic yard.
- K. Unit Price No. 11: Suitable Material Import, Placement, and Compaction.
1. Unit of Measurement: Unit of Measurement: Cubic yard.
- L. Unit Price No. 12: Undercut, dispose on-site, and refill with MSHA #2 or #57 stone compact per specified requirements at trench areas only.

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1. Unit of Measurement: Unit of Measurement: Cubic yard.
- M. Unit Price No. 13: Undercut, dispose offsite, and refill with CR-6 and compact per specified requirements at trench areas only.
 1. Unit of Measurement: Unit of Measurement: Cubic yard.
- N. Unit Price No. 14: Undercut, dispose on-site, and refill with MSHA #2 or #57 stone compact per specified requirements in open areas only.
 1. Unit of Measurement: Unit of Measurement: Cubic yard.
- O. Unit Price No. 15: Undercut, dispose offsite, and refill with CR-6 and compact per specified requirements at open areas only.
 1. Unit of Measurement: Unit of Measurement: Cubic yard.

END OF SECTION 012200

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, coordination, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other work of the Contract.
- C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate #1: Paved Sidewalk, Amphitheater Stage, and Amphitheater Electrical. Provide outdoor paved stage adjacent to the Restrooms on the west side of the building and adjacent paved sidewalks. The stage and adjoining sidewalks will consist of unit pavers. Company switches and associated electrical at Lawn. Empty raceway is part of Base Scope.
- B. Alternate #2: Accent Lighting. Additional accent lighting as follows: Linear strips (ecosense) at Lobby, Audience Chamber, Sound and Light Lock, and Multipurpose Room.
- C. Alternate #3: Theatrical Alternate. Multipurpose Room Theatrical Lighting Fixture Package. A dedicated package of theatrical lighting fixtures and accessories will be provided for use in the Multipurpose Room.
- D. Alternate #4: AV Alternate. In-ear monitoring system to include 8 channels of wireless transmitters, 8 receivers with earphones, a portable rack, power distribution, and a utility drawer for storage of receivers and earphones.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for products selected under an alternate.
 - 2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
 - 3. Substitution Request Form, included in Project Manual following this specification section, for use in requesting substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 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 facsimile of form provided in Project Manual.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.

- b. Coordination of 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 substitutions 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 as well as 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 substitutions 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 through Construction Manager 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.

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 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. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed unless otherwise indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SUBSTITUTION REQUEST FORM

1.1 CONDITIONS OF SUBSTITUTIONS

- A. Substitution indicated on this Form is a proposed substitute to requirements indicated in the Specifications and Drawings. Substitution listed has not been included in an Addendum. Submit one Form for each proposed substitution.
- B. For each proposed Substitution, state difference in price or "No Change" where Substitution is offered.
- C. Attach complete technical data, specifications, and description of substitutions.
- D. Architect reserves the right to accept or reject any or all proposed substitutions.

1.2 SUBSTITUTION REQUEST

The following information is hereby submitted for a substitution to the specified item.

Specification Section and Title: _____

Paragraph _____ Page _____ Specified Item _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____ Phone: _____

Trade Name: _____ Model No: _____

Price Difference: _____ or No Change _____

The Undersigned certifies:

- A. Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- B. Same warranty will be furnished for proposed substitution as for specified product.
- C. Same maintenance service and source of replacement parts, as applicable is available.
- D. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- E. Proposed substitution does not affect dimensions and functional clearances.
- F. Payment will be made for changes to the building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____ FAX: _____

ARCHITECT'S REVIEW AND ACTION

- Substitution Approved – Make submittals in accordance with Section 013300 – Submittal Procedures..
- Substitution Approved As Noted – Make submittals in accordance with Section 013300 – Submittal Procedures.
- Substitution Rejected – Use specified materials.
- Substitution Request Received Too Late. Use specified materials.

Signed by: _____

Supporting Data Attached: Drawings Product Data Samples Tests
 Reports Other _____

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.

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 items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect and Owner 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. Arrange schedule of values consistent with format of AIA Document G703.
 - 2. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of \$15,000.
 - 3. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
 - 4. 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.
 - 5. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.
 - 6. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
 - 7. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
 - 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- 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 for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit three signed and notarized original copies of each Application for Payment by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 - 1. List of subcontractors.
 - 2. Schedule of values.
 - 3. Contractor's construction schedule (preliminary if not final).
 - 4. Products list (preliminary if not final).
 - 5. Sustainable design action plans, including preliminary project materials cost data.
 - 6. Schedule of unit prices.
 - 7. Submittal schedule (preliminary if not final).
 - 8. List of Contractor's staff assignments.
 - 9. List of Contractor's principal consultants.
 - 10. Copies of building permits.
 - 11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 - 12. Initial progress report.
 - 13. Certificates of insurance and insurance policies.
 - 14. Performance and payment bonds.

15. Data needed to acquire Owner's insurance.
- G. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- H. 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, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.
 - 4. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.
 - 5. Request for Information form included in Project Manual following this specification section.

1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, telephone number, and email address 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, 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. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in facility. Keep list current at all times.

1.5 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.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated 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. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative 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. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling, raised access floor, and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door

- floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format and PDF format.
 3. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM established for Project.
 - a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner 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. Owner name.
 3. Owner's Project number.
 4. Name of Architect.
 5. Architect's Project number.
 6. Date.
 7. Name of Contractor.
 8. RFI number, numbered sequentially.
 9. RFI subject.
 10. Specification Section number and title and related paragraphs, as appropriate.
 11. Drawing number and detail references, as appropriate.
 12. Field dimensions and conditions, as appropriate.
 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 14. Contractor's signature.
 15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Form bound in Project Manual.
1. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven 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 Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. 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 by Architect of additional information.
 3. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 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 returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- 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 and Owner within seven days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Refer to Section 013333 "Electronic Drawings" and Digital Data Licensing Agreement included in Project Manual for procedures regarding Architect's Data Files.
- B. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 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 a minimum of 10 working days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: 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 unless noted otherwise.
1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, 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. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Sustainable design requirements.
 - o. Preparation of Record Documents.
 - p. Use of the premises and existing building.
 - q. Work restrictions.
 - r. Working hours.
 - s. Owner's occupancy requirements.
 - t. Responsibility for temporary facilities and controls.
 - u. Procedures for moisture and mold control.
 - v. Procedures for disruptions and shutdowns.
 - w. Construction waste management and recycling.
 - x. Parking availability.
 - y. Office, work, and storage areas.
 - z. Equipment deliveries and priorities.
 - aa. First aid.
 - bb. Security.
 - cc. Progress cleaning.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Sustainable Design Requirements Coordination Conference: Owner will schedule and conduct a sustainable design coordination conference before starting construction, at a time convenient to Owner Architect, and Contractor.
1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent and sustainable design coordinator; 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 meeting sustainable design requirements, including the following:
 - a. Sustainable design Project checklist.
 - b. General requirements for sustainable design-related procurement and documentation.

- c. Project closeout requirements and sustainable design certification procedures.
 - d. Role of sustainable design coordinator.
 - e. Construction waste management.
 - f. Construction operations and sustainable design requirements and restrictions.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for 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, Owner, and Owner's Commissioning Authority 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 requirements.
 - 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.
- E. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for completing sustainable design documentation.
 - f. Requirements for preparing operations and maintenance data.
 - g. Requirements for delivery of material samples, attic stock, and spare parts.
 - h. Requirements for demonstration and training.
 - i. Preparation of Contractor's punch list.
 - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - k. Submittal procedures.
 - l. Coordination of separate contracts.
 - m. Owner's partial occupancy requirements.
 - n. Installation of Owner's furniture, fixtures, and equipment.
 - o. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- F. Progress Meetings: Conduct progress meetings at regular intervals as determined by Conditions of the Contract.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority 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.
 3. 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 use.
 - 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.
4. 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

REQUEST FOR INTERPRETATION

Client: Garrett College
Project: CEPAC
Garrett College PN# CC-15-MC17-449
DLR Comm. No.: 56-18107-00
File No.:

DATE:
INITIATED BY:
DIRECTED TO:
RE:

RFI NO.:

SUBJECT:

SIGNED: _____

REPLY:

The Work shall be carried out in accordance with the supplemental information or clarifications included in the Reply and issued in accordance with the Contract Documents without change in the Contract Sum or Contract Time. Proceeding with the Work in accordance with the Reply indicates your acknowledgment that there will be no change in the Contract Sum or Contract Time.

Where the Reply requires a change to the Contract Sum or Contract Time, submit a detailed breakdown indicating the increased sum or time required. Proceed with the Reply ONLY when the Owner and the Architect give written authorization for the change to the Contract Sum or Contract Time.

REPLY ISSUED
BY:

FIRM:

DATE:

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Unusual event reports.
- B. Related Requirements:
 - 1. Section 014000 "Quality Requirements" for schedule of tests and inspections.
 - 2. Section 012900 "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.

1.3 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. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. 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 the critical path of Project and when activities can be performed.

- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. 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.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file in software format useable by Owner and Architect.
 - 2. PDF file.
- B. Startup construction schedule.
 - 1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
 - 3. Total Float Report: List of activities sorted in ascending order of total float.

4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Daily Construction Reports: Submit at weekly intervals.
- H. Material Location Reports: Submit at weekly intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Unusual Event Reports: Submit at time of unusual event.
- K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 1. Review software limitations and content and format for reports.
 2. Verify availability of qualified personnel needed to develop and update schedule.
 3. Discuss constraints, including phasing, area separations, interim milestones, and partial Owner occupancy.
 4. Review delivery dates for Owner-furnished products.
 5. Review schedule for work of Owner's separate contracts.
 6. Review submittal requirements and procedures.
 7. Review time required for review of submittals and resubmittals.
 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
 9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
 10. Review and finalize list of construction activities to be included in schedule.
 11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

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

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting, using CPM scheduling.
 1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- C. Time Frame: Extend schedule from date established for the Notice to Proceed 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.
- D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
 - a. Securing of approvals and permits required for performance of the Work.
 - b. Temporary facilities.
 - c. Construction of mock-ups, prototypes and samples.
 - d. Owner interfaces and furnishing of items.
 - e. Interfaces with Separate Contracts.
 - f. Regulatory agency approvals.
 - g. Punch list.
 3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 4. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 6. Commissioning Time: Include no fewer than 15 days for commissioning.

7. 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.
 8. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.
- E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use-of-premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Building flush-out.
 - m. Startup and placement into final use and operation.
 - n. Commissioning.
 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.

- c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- G. 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 the Contract Time.
- H. 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.
- 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.

1.8 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice of Award.
1. Base schedule on the startup construction schedule and additional information received since the start of Project.

- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.9 CPM SCHEDULE REQUIREMENTS

- A. Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice of Award. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's Construction Schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule, so it can be accepted for use no later than 60 days after date established for the Notice of Award.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.
 - 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and inspection.
 - j. Commissioning.
 - k. Punch list and Final Completion.
 - l. Activities occurring following Final Completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
 5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, sustainable design documentation, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
 - a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
 - b. Total cost assigned to activities shall equal the total Contract Sum.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.

- H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
 2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
 3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
 4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts one week before each regularly scheduled progress meeting.

1.10 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. Testing and inspection.
 8. Accidents.
 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. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.

3. Material stored following previous report and remaining in storage.
- C. 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.
- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
 1. Submit unusual event reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Submittal schedule requirements.
 - 2. Administrative and procedural requirements for submittals.
- B. Related Requirements:
 - 1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
 - 3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 4. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
 - 5. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
 - 6. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 7. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
 - 8. Section 018113.14 "Sustainable Design Requirements - LEED v4 BD+C" for sustainable design submittals.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- 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. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 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. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 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. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.
- E. Submittals for Web-Based Project Software: Prepare submittals as PDF files, or other format indicated by Project software website.

1.6 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 1. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
- 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.
 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- 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.

1.7 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.
- 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. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the

following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

- a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.
 - 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:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.

- 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.

1.8 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 digitally signed PDF file 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.
- C. BIM Incorporation: Incorporate delegated-design drawing and data files into BIM established for Project.
 1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as original Drawings.

1.9 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 indication in web-based Project software. 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.

1.10 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it.
 1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.
 2. Paper Submittals: Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
 3. Submittals by Web-Based Project Software: Architect will indicate, on Project software website, the appropriate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will return without review or discard submittals received from sources other than Contractor.

- F. Submittals not required by the Contract Documents will be returned by Architect without action.
- G. Reproduce and distribute submittals that the Architect reviews and stamps as follows, to indicate the action taken:
1. Reviewed: Where submittal is marked “Reviewed,” that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
 2. Reviewed – Additional Information Required: Where submittal is marked “Reviewed – Additional Information Required,” the information submitted has been reviewed, however, additional information as noted and/or required by the Contract Documents needs to be submitted.
 3. Furnish As Corrected: When submittal is marked “Furnish As Corrected,” that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
 4. Revise and Resubmit: When submittal is marked “Revise and Resubmit,” do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
 - a. Do not permit submittals marked “Revise and Resubmit” to be used at the Project site, or elsewhere where Work is in progress.
 5. Rejected: When submittal is marked “Rejected,” information submitted is not in compliance with Contract Documents. Resubmit submittal as required by Contract Documents.
 6. Not Reviewed: When submittal is marked “Not Reviewed,” submittal is incomplete without sufficient information to review as identified above, submittal is not required by Construction Documents, or is not specific to Project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 013333 – ELECTRONIC DRAWINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The Architect-Engineer, if requested, will provide the Contractor with one (1) electronic copy of the Contract Document Drawings for distribution to subcontractors and suppliers. The electronic copy will be provided in the BIM version in which it was created.
- B. The Architect-Engineer shall be paid a service fee of \$250.00, plus \$50.00 for each sheet as requested by the Contractor in accordance with the Agreement. Electronic files of these sheets will be released upon receipt of payment.

1.3 REFERENCES

- A. A copy of the DLR Group Custom AIA Document C106-2013 Digital Licensing Agreement, which is to be executed prior to release of electronic files, is included at the end of the Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013333

DRAFT AIA® Document C106™ – 2013

Digital Data Licensing Agreement

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

BETWEEN the Party transmitting Digital Data ("Transmitting Party"):
(Name, address and contact information, including electronic addresses)

DLR Group of DC, PC
419 7th Street, NW, 2nd Floor
Washington, DC 20004

and the Party receiving the Digital Data ("Receiving Party"):
(Name, address and contact information, including electronic addresses)

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

Garrett College
Community Education and Performing Arts Center (CEPAC), PN #CC-15-MC17-449
McHenry, Maryland

The Transmitting Party and Receiving Party agree as follows.

TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 TRANSMISSION OF DIGITAL DATA
- 3 LICENSE CONDITIONS
- 4 LICENSING FEE OR OTHER COMPENSATION
- 5 DIGITAL DATA

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 The purpose of this Agreement is to grant a license from the Transmitting Party to the Receiving Party for the Receiving Party's use of Digital Data on the Project, and to set forth the license terms.

§ 1.2 This Agreement is the entire and integrated agreement between the parties. Except as specifically set forth herein, this Agreement does not create any other contractual relationship between the parties.

§ 1.3 For purposes of this Agreement, the term Digital Data is defined to include only those items identified in Article 5 below.

§ 1.3.1 Confidential Digital Data is defined as Digital Data containing confidential or business proprietary information that the Transmitting Party designates and clearly marks as "confidential."

ADDITIONS AND DELETIONS:

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

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

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

ARTICLE 2 TRANSMISSION OF DIGITAL DATA

§ 2.1 The Transmitting Party grants to the Receiving Party a nonexclusive limited license to use the Digital Data identified in Article 5 solely and exclusively to perform services for, or construction of, the Project in accordance with the terms and conditions set forth in this Agreement.

§ 2.2 The transmission of Digital Data constitutes a warranty by the Transmitting Party to the Receiving Party that the Transmitting Party is the copyright owner of the Digital Data, or otherwise has permission to transmit the Digital Data to the Receiving Party for its use on the Project in accordance with the terms and conditions of this Agreement.

§ 2.3 If the Transmitting Party transmits Confidential Digital Data, the transmission of such Confidential Digital Data constitutes a warranty to the Receiving Party that the Transmitting Party is authorized to transmit the Confidential Digital Data. If the Receiving Party receives Confidential Digital Data, the Receiving Party shall keep the Confidential Digital Data strictly confidential and shall not disclose it to any other person or entity except as set forth in Section 2.3.1.

§ 2.3.1 The Receiving Party may disclose the Confidential Digital Data as required by law or court order, including a subpoena or other form of compulsory legal process issued by a court or governmental entity. The Receiving Party may also disclose the Confidential Digital Data to its employees, consultants or contractors in order to perform services or work solely and exclusively for the Project, provided those employees, consultants and contractors are subject to the restrictions on the disclosure and use of Confidential Digital Data as set forth in this Agreement.

§ 2.4 The Transmitting Party retains its rights in the Digital Data. By transmitting the Digital Data, the Transmitting Party does not grant to the Receiving Party an assignment of those rights; nor does the Transmitting Party convey to the Receiving Party any right in the software used to generate the Digital Data.

§ 2.5 To the fullest extent permitted by law, the Receiving Party shall indemnify and defend the Transmitting Party from and against all claims arising from or related to the Receiving Party's modification to, or unlicensed use of, the Digital Data.

ARTICLE 3 LICENSE CONDITIONS

The parties agree to the following conditions on the limited license granted in Section 2.1:

(State below rights or restrictions applicable to the Receiving Party's use of the Digital Data, requirements for data format, transmission method or other conditions on data to be transmitted.)

«Architect-Engineer of Record (AER) makes no representation as to the compatibility of the Computer Aided Drafting/Building Information Model (CAD/BIM) files with any hardware or software.

AER makes no representation regarding the accuracy, completeness, or permanence of CAD/BIM files, nor for their merchantability or fitness for a particular purpose. Addenda information or revisions made after the date indicated on the CAD/BIM files may not have been incorporated. In the event of a conflict between the AER's sealed Contract Drawings and CAD/BIM files, the sealed Contract Drawings shall govern. It is the Owner, Contractor, or Third Party's (OCT) responsibility to determine if any conflicts exist. The CAD/BIM files shall not be considered to be Contract Documents as defined by the General Conditions of the Contract for Construction.

The use of CAD/BIM files prepared by the AER shall not in any way obviate the OCT's responsibility for the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.

This Agreement shall be governed by the laws of the principal place of business of the AER.»

ARTICLE 4 LICENSING FEE OR OTHER COMPENSATION

§ 4.1 There is no charge to the Owner receiving Architect-Engineer generated Digital Data for its internal facility management use.

The Transmitting Party agrees to send the Digital Data upon receipt of the fee or other compensation as indicated in Specification Section 013333, Electronic Drawings, for the Receiving Party's use of the Digital :

(State the fee, in dollars, or other method by which the Receiving Party will compensate the Transmitting Party for the Receiving Party's use of the Digital Data.)

«The Transmitting Party will provide the Digital Data, dated _____, for the following drawings:

_____	_____
_____	_____
_____	_____
_____	_____

Drawings were prepared on the following:

Computer Software: _____ / Version: _____ . »

ARTICLE 5 DIGITAL DATA

The Parties agree that the following items constitute the Digital Data subject to the license granted in Section 2.1: (Identify below, in detail, the information created or stored in digital form the parties intend to be subject to this Agreement.)

« »

This Agreement is entered into as of the day and year first written above and will terminate upon Substantial Completion of the Project, as that term is defined in AIA Document A201™-2007, General Conditions of the Contract for Construction, unless otherwise agreed by the parties and set forth below. (Indicate when this Agreement will terminate, if other than the date of Substantial Completion.)

« »

TRANSMITTING PARTY (Signature)

RECEIVING PARTY (Signature)

« »« »

(Printed name and title)

« »« »

(Printed name and title)

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection 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. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, 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.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. 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, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

- D. Mockups: Full-size physical assemblies that are constructed either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and 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. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements or if indicated as in-place portions of permanent construction, consisting of multiple products, assemblies, and subassemblies, with cutaways enabling inspection of concealed portions of the Work.
 - a. Include each system, assembly, component, and part of the exterior wall and roof to be constructed for the Project. Colors of components shall be those selected by the Architect for use in the Project.
 2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
 3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- E. 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. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" shall have the same meaning as the term "testing agency."
- I. 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.
- J. 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. Contractor's quality-control services do not include contract administration activities performed by Architect[**or Construction Manager**].

1.4 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.5 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification 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.

1.6 ACTION SUBMITTALS

- A. Mockup Shop Drawings: For integrated mockups.
 - 1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
 - 2. Indicate manufacturer and model number of individual components.
 - 3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.

- C. 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. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- F. Reports: Prepare and submit certified written reports and documents as specified.
- G. 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.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
 - 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 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, telephone number, and email address 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 inspection.
 - 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. Name, address, telephone number, and email address of technical representative making report.

2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement of whether conditions, products, and installation will affect warranty.
 7. 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. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement of whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

- A. 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, applying, 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 is similar in material, design, and extent to those indicated for this Project.

- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged in the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. 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.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. 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 Contractor's responsibilities, including the following:
1. Provide test specimens representative of proposed products and construction.
 2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 4. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
 5. Build laboratory mockups at testing facility, using personnel, products, and methods of construction indicated for the completed Work.
 6. When testing is complete, remove test specimens and test assemblies, and mockups, and laboratory mockups; do not reuse products on Project.
 7. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, 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.
- K. 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 of size indicated or, if not indicated, as directed by Architect.
 2. Build mockups in location indicated or, if not indicated, as directed by Architect.

3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
 8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 10. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.
1. Coordinate construction of the mockup to allow observation of air barrier installation, flashings, air barrier integration with fenestration systems, and other portions of the building air/moisture barrier and drainage assemblies, prior to installation of veneer, cladding elements, and other components that will obscure the work.
- M. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.11 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 inspection they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Engage a qualified testing agency to perform quality-control services.

- a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. 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.
- D. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations 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 duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives 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 inspection. 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 inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
 2. Distribution: Distribute schedule to Owner, Architect, Commissioning Authority, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.12 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect, Commissioning Authority, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Commissioning Authority with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, 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 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes 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.

1.3 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use. Provide connections and extensions of services as required for construction operations.

1.4 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. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.

- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, tpestyles, graphic elements, and message content.
- D. Erosion and Sedimentation Control Plan: Show compliance with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- E. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- F. 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 sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 - 3. Indicate methods to be used to avoid trapping water in finished work.
- G. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air-filtration system discharge.
 - 4. Waste-handling procedures.
 - 5. Other dust-control measures.
- H. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:
 - 1. Methods used to meet the goals and requirements of the Owner.
 - 2. Concrete cutting method(s) to be used.
 - 3. Location of construction devices on the site.
 - 4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
 - 5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.
 - 6. Indicate locations of sensitive equipment areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 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. Wood Enclosure Fence: Plywood, 6 feet (1.8 m) high, framed with four 2-by-4-inch (50-by-100-mm) rails, with preservative-treated wood posts spaced not more than 8 feet (2.4 m) apart.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.
- C. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches (914 by 1524 mm).
- D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices: Owner will provide conditioned interior space for field offices for duration of Project.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

TEMPORARY FACILITIES AND CONTROLS

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- 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, Cooling, and Dehumidifying 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] <Insert number> at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures."

- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

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.
- 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: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Temporary 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.
 - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- G. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel.
 - 1. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.

- b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. Engineers' offices.
 - g. Owner's office.
 - h. Principal subcontractors' field and home offices.
- J. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Architect and Owner.

3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
- 1. Utilize designated area within existing building for temporary field offices.
 - 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. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
- 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - 2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 312000 "Earth Moving."
 - 3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 - 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
- 1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: Provide temporary offsite parking areas for construction personnel.

- F. Storage and Staging: Provide temporary offsite area for storage and staging needs.
- G. 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.
- H. Project Signs: Provide Project signs as approved by Owner. Unauthorized signs are not permitted.
 - 1. 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.
 - 2. Maintain and touch up signs, so they are legible at all times.
- I. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- K. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
 - 1. Do not load elevators beyond their rated weight capacity.
 - 2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work, so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
- L. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.
- M. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 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.
 - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- 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.
 - 1. Comply with work restrictions specified in Section 011000 "Summary."
- 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, requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.
- 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: 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.
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- K. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
 - 1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 - 2. Paint and maintain appearance of walkway for duration of the Work.
- L. 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 incomplete, insulate temporary enclosures.
- M. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
 - 1. Construct dustproof partitions with gypsum wallboard, with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
 - 2. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Cover floor with two layers of 6-mil (0.14-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
 - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.
 - 3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - 4. Insulate partitions to control noise transmission to occupied areas.
 - 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - 6. Protect air-handling equipment.
 - 7. Provide walk-off mats at each entrance through temporary partition.
- N. 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. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Where required by Authorities Having Jurisdiction, provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 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 Period: 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 Period: 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 Period: 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.
 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 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for 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 011000 "Summary" for Contractor requirements related to Owner-furnished products.
 - 2. Section 012100 "Allowances" for products selected under an allowance.
 - 3. Section 012300 "Alternates" for products selected under an alternate.
 - 4. Section 012500 "Substitution Procedures" for requests for substitutions.
 - 5. Section 017700 "Closeout Procedures" for submitting warranties.

1.3 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. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
 - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, 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 single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model

number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
 2. Data indicating compliance with the product and project requirements.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures and "Substitution Request Form" included in Project Manual.
- F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

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. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 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 that products are undamaged and properly protected.
- C. Storage:
 1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
 2. Store products to allow for inspection and measurement of quantity or counting of units.
 3. Store materials in a manner that will not endanger Project structure.
 4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.

5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.

1.7 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 standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to 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 in the Project Manual, prepare a written document, using indicated form properly executed.
 3. See 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 meeting requirements of the Contract Documents.

PRODUCT REQUIREMENTS

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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.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole 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.
 - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."
2. Sole 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.
 - a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
3. Limited List of Products: 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.
 - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
4. Non-Limited List of Products: 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.
 - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
5. Limited List of Manufacturers: 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 unless otherwise indicated.
 - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
6. Non-Limited List of Manufacturers: 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.

- a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
7. 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 may additionally 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.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require the phrase "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 a 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.
- E. Sustainable Product Selection: Where Specifications require product to meet sustainable product characteristics, select products complying with indicated requirements. Comply with requirements in Division 01 sustainability requirements Section and individual Specification Sections.
 1. Select products for which sustainable design documentation submittals are available from manufacturer.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: 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 the following requirements:
 1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.

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.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."
1. Form of Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
 2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes 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-provided, Contractor-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for coordination of Owner-furnished products, Owner's separate contracts, and limits on use of Project site.
 - 2. Section 013300 "Submittal Procedures" for submitting surveys.
 - 3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
 - 4. Section 024116 "Structure Demolition" for demolition and removal of selected portions of the building.
 - 5. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.
 - 1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.
 - 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

- B. Layout Conference: Conduct conference at Project site.
 - 1. Prior to establishing layout of new and existing perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:
 - a. Contractor's superintendent.
 - b. Contractor's personnel responsible for performing Project surveying and layout.
 - 2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
 - 3. Review requirements for including layouts on Shop Drawings and other submittals.
 - 4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor or professional engineer.

- B. Certified Surveys: Submit two copies signed by land surveyor or professional engineer.

- C. Certificates: Submit certificate signed by land surveyor or professional engineer, certifying that location and elevation of improvements comply with requirements.

- D. Cutting and Patching Procedures: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 2. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

- a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- E. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.6 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Professional Engineer Qualifications: Refer to Section 014000 "Quality Requirements."
- C. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. 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.

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- 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. Use materials that are not considered hazardous.
 - 2. Use materials that minimize thermal bridging and protect building envelope.
- C. 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 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, gas service piping, 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. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.

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4. Recommended corrections.

- D. 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, Engineer, and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with 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 and existing conditions. If discrepancies are discovered, notify Architect promptly.
- B. Engage a land surveyor or professional engineer experienced in laying out the Work, using the following 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.
- 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.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- 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.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- 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.

3.5 INSTALLATION

- A. 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.
 4. Maintain minimum headroom clearance in occupied spaces and unoccupied spaces to meet code requirements and requirements of Authorities Having Jurisdiction.
- 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 best possible results as judged by Architect and Owner. 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 of type expected for Project.
- 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: Select tools or equipment that minimize production of excessive 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 portions of the 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 with manufacturer.
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, as judged by Architect. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.
- K. Connections: Seal around all penetrations, connections to existing building envelope, and ties to existing construction for a liquid and air tight building envelope.

- L. Use materials and methods to minimize thermal bridging between components.

3.6 CUTTING AND PATCHING

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. 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: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 011000 "Summary."
- 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, as judged by Architect. 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 eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 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.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
 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. 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.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- 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.

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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: 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. Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."
- 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 ensure 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. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.9 PROTECTION AND REPAIR 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. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- D. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

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SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Section 042000 "Unit Masonry" for disposal requirements for masonry waste.
 - 2. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition and construction 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.

1.5 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. LEED Submittal: Submit documentation to USGBC, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met. Respond to questions and requests from USGBC regarding construction waste management and disposal until the USGBC has made its determination on the Project's LEED certification application. Document correspondence with USGBC as informational submittals.

- H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent may serve as Waste Management Coordinator.
 - 1. Waste management coordinator may also serve as LEED coordinator.
- B. Refrigerant Recovery Technician Qualifications: Universal certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.
- D. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of

each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work in compliance with Section 024116 "Structure Demolition" and Section 024119 "Selective Demolition."
2. Salvaged Materials for Sale: If permitted by Owner, for materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: If permitted by Owner, for materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 3. Store items in a secure area until installation.
 4. Protect items from damage during transport and storage.
 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Not permitted on Project site.
- C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- F. Plumbing Fixtures: Separate by type and size.
- G. Lighting Fixtures: Separate lamps by type and protect from breakage.
- H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.4 RECYCLING DEMOLITION WASTE

- A. General: The following materials are listed for illustrative purposes. Actual demolition waste will vary by project requirements.
- B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.
- C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - 1. Crush concrete and screen to comply with requirements in Section 312000 "Earth Moving" if allowable for use as satisfactory soil for fill or subbase.
- D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 - 1. Clean and stack undamaged, whole masonry units on wood pallets.
- E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- F. Metals: Separate metals by type.
 - 1. Structural Steel: Stack members according to size, type of member, and length.
 - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

- G. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.
- H. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
- J. Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels and tile, and sort with other metals.
- K. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 - 1. Store clean, dry carpet and pad in a closed container or trailer provided by carpet reclamation agency or carpet recycler.
- L. Carpet Tile: Remove debris, trash, and adhesive.
 - 1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.
- M. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.
- N. Conduit: Reduce conduit to straight lengths and store by material and size.
- O. Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.

3.5 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
 - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

- D. Paint: Seal containers and store by type.

3.6 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. General: Except for items or materials to be salvaged or recycled, remove waste materials and legally dispose of at designated spoil areas on Owner's property.
- C. Burning: Do not burn waste materials.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for 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 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
 - 2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 4. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.3 DEFINITIONS

- A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.5 CLOSEOUT SUBMITTALS

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

1.6 MAINTENANCE MATERIAL SUBMITTALS

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

1.7 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, 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 Owner. Label with manufacturer's name and model number.
 - 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 Owner's signature for receipt of submittals.
 - 5. Submit testing, adjusting, and balancing records.
 - 6. Submit sustainable design submittals not previously submitted.
 - 7. 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 utility services.
 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.
 10. Touch up paint 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. The Architect will perform no more than one (1) inspection to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.
 2. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 3. Results of completed inspection will form the basis of requirements for Final Completion.

1.8 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures" and contractual 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.
- B. Inspection: Submit a written request for final inspection to determine acceptance 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 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. The Architect will perform no more than one (1) inspection to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.
 2. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 LIST OF INCOMPLETE ITEMS

- 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 logical sequential order, listed by room or space number.
 2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in one of the following formats, unless noted otherwise:
 - a. MS Excel Electronic File: Architect will return annotated file.
 - b. PDF Electronic File: Architect will return annotated file.
 - c. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

1.10 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 - 1. Submit on digital media acceptable to Architect.
- E. Warranties in Paper Form:
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- F. 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 and applicable LEED version requirements.

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.

CLOSEOUT PROCEDURES

017700-5

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 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 not planted, mulched, or 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. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
 - i. Vacuum and mop concrete.
 - j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - l. Remove labels that are not permanent.
 - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
 - q. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
 - r. Clean strainers.
 - s. 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. Construction Waste Disposal: Comply with waste-disposal requirements in Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Systems and equipment operation manuals.
 - 2. Systems and equipment maintenance manuals.
 - 3. Product maintenance manuals.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Section 019113 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect and Commissioning Authority will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:

1. Submit on digital media acceptable to Architect and Owner. Enable reviewer comments on draft submittals.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.
- D. Final 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 and Commissioning Authority will return copy with comments.
 1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. 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: Bookmark 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.

1.6 REQUIREMENTS FOR OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: 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.
- B. 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.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. 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 has 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.

C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Names and contact information for all Subcontractors, Manufacturers, and suppliers who participated in the construction or who furnished materials and equipment for the Project.
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.
10. Catalog data on all plumbing fixtures, valves, water heaters, heating equipment, temperature controls, fans, electrical panels, service entrance equipment, light fixtures, similar equipment and systems. Manufacturer's advertising or promotional literature will not be acceptable.
11. Detailed one-line, color-coded wiring diagrams.

D. 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.

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

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

1.8 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.

2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. 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 warranties and bonds as described below.
- C. 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 and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; 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.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 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.
- E. 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.
- F. 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.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

- G. 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.
- H. Maintenance Service Contracts: Where applicable to Project, include copies of maintenance agreements with name and telephone number of service agent.
- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.
- J. 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 maintenance manuals.

1.9 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. 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.
- C. 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 and drawing or schedule designation or identifier where applicable.
- D. 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.
 - 6. Name and contact information of installing Subcontractor.
- E. 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, including list of most frequently encountered breakdowns and repairs.

- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous Record Submittals.
- B. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for general closeout procedures.
 - 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one of file prints.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one set of prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

- D. Reports: Submit written report indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.
- E. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

1.4 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. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 - 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - 6. Note Alternate numbers, Change Order numbers, and similar identification, where applicable.

- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
 - 1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 - 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 - 1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - 2. Format: Annotated PDF electronic file.
 - 3. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

1.5 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. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 - 3. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Specifications.

1.6 RECORD PRODUCT DATA

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

- B. Format: Submit record Product Data as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Product Data.
 - 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 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.
 - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Instruction in operation and maintenance of systems, subsystems, and equipment.

1.3 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.
- B. Qualification Data: For facilitator.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

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.

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. Prior to the demonstration of equipment, the Contractor shall submit operations and maintenance manuals to the A/E for approval. Refer to Section 017823 "Operation and Maintenance Data" for submittal requirements.
- C. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- D. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.6 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. Systems and equipment operation manuals.
 - c. Systems and equipment maintenance manuals.
 - d. Product maintenance manuals.
 - e. Project Record Documents.
 - f. Identification systems.
 - g. Warranties and bonds.
 - h. 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.

1.7 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."

- B. Set up instructional equipment at instruction location.

1.8 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Owner will furnish 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 with at least two weeks' 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. Cleanup: Collect used and leftover educational materials and remove from Project site unless requested by Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

SECTION 018113.14 - SUSTAINABLE DESIGN REQUIREMENTS - LEED v4 BD+C

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general requirements and procedures for compliance with certain prerequisites and credits needed for Project to obtain "LEED Version 4 for Building Design and Construction" (LEED v4 BD+C) Silver certification based on USGBC's LEED v4 BD+C.
 - 1. Specific requirements for LEED are also included in other Sections.
 - 2. Some LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
 - 3. A copy of the LEED Project checklist is attached at the end of this Section for information only.
 - a. Some LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.

1.3 DEFINITIONS

- A. LEED: USGBC's "LEED Version 4 for Building Design and Construction."
 - 1. Definitions that are a part of "LEED Version 4 for Building Design and Construction" (LEED v4 BD+C) apply to this Section.
- B. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001. Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
- C. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.
- D. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

1. "Postconsumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
2. "Preconsumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials, such as rework, regrind, or scrap, generated in a process and capable of being reclaimed within the same process that generated it.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site. Review LEED requirements and action plans for meeting requirements.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Respond to questions and requests from Architect and the USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the Project's LEED certification application. Document responses as informational submittals.
- B. Submit documentation to USGBC and respond to questions and requests from USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the Project's LEED certification application.
 1. Document correspondence with USGBC as informational submittals.

1.6 ACTION SUBMITTALS

- A. General: Submit additional sustainable design submittals required by other Specification Sections.
- B. Sustainable design submittals are in addition to other submittals.
 1. If submitted item is identical to that submitted to comply with other requirements, include an additional copy with other submittal as a record copy of compliance with indicated LEED requirements instead of separate sustainable design submittal. Mark additional copy "Sustainable design submittal."
- C. Sustainable Design Documentation Submittals:
 1. Environmental Product Declarations complying with LEED requirements.
 2. Documentation for products that comply with LEED requirements for multi-attribute optimization.
 - a. Include documentation for regional materials, indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material and costs of regional materials.

3. Sustainability reports for products that comply with LEED requirements for raw material and source extraction reporting.
4. Documentation for products that comply with LEED requirements for leadership extraction practices. Include the following:
 - a. Product data and certification letter from product manufacturers, indicating participation in an extended producer responsibility program and statement of costs.
 - b. Product data and certification for bio-based materials, indicating that they comply with requirements. Include statement of costs.
 - c. Product data and chain-of-custody certificates for products containing certified wood. Include statement of costs.
 - d. Receipts for salvaged and refurbished materials used for Project, indicating sources and costs.
 - e. Product data and certification letter from product manufacturers, indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement of costs.
 - f. Documentation for regional materials, indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material and costs of regional materials.
5. Material ingredient reports for products that comply with LEED requirements for material ingredient reporting.
6. Documentation for products that comply with LEED requirements for material ingredient optimization.
7. Documentation for products that comply with LEED requirements for product manufacturer supply chain optimization.
 - a. Include documentation for regional materials, indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material and costs of regional materials.
8. Documentation complying with Section 017419 "Construction Waste Management and Disposal."
9. Product data for adhesives and sealants used inside the weatherproofing system, indicating VOC content and laboratory test reports showing compliance with requirements for low-emitting materials.
10. Product data for paints and coatings used inside the weatherproofing system, indicating VOC content and laboratory test reports showing compliance with requirements for low-emitting materials.
11. Laboratory test reports for flooring, indicating compliance with requirements for low-emitting materials.
12. Laboratory test reports for products containing composite wood or agrifiber products or wood glues, indicating compliance with requirements for low-emitting materials.
13. Laboratory test reports for ceilings, walls, and thermal insulation, indicating compliance with requirements for low-emitting materials.
14. Construction Indoor-Air-Quality (IAQ) Management:
 - a. Construction IAQ management plan.
 - b. Product data for temporary filtration media.
 - c. Product data for filtration media used during occupancy.
 - d. Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.

15. IAQ Assessment:

- a. Signed statement describing the building air flush-out procedures, including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
- b. Product data for filtration media used during flush-out and occupancy.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For LEED coordinator.
- B. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:
 1. Plumbing.
 2. Mechanical.
 3. Electrical.
 4. Specialty items, such as elevators and equipment.
- C. Sustainable Design Action Plans: Provide preliminary submittals within 30 days of date established for the Notice to Proceed, indicating how the following requirements will be met:
 1. List of proposed products with Environmental Product Declarations.
 2. List of proposed products complying with requirements for multi-attribute optimization.
 3. List of proposed products complying with requirements for raw material and source extraction reporting.
 4. List of proposed products complying with requirements for leadership extraction practices.
 5. List of proposed products complying with requirements for material ingredient reporting.
 6. List of proposed products complying with requirements for material ingredient optimization.
 7. List of proposed products complying with requirements for product manufacturer supply chain optimization.
 8. Waste management plan complying with Section 017419 "Construction Waste Management and Disposal."
 9. Construction IAQ management plan.
- D. Sustainable Design Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with sustainable design action plans.

1.8 QUALITY ASSURANCE

- A. LEED Coordinator: Engage an experienced LEED-accredited professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to these LEED credits, the Contractor shall provide additional materials and procedures necessary to obtain LEED credits indicated.
- B. At least 20 different products from at least five different manufacturers shall have Environmental Product Declarations that comply with LEED requirements. Industry-wide (generic) Environmental Product Declarations shall be valued as one-half of a product.
- C. At least 50 percent, by cost, of the permanently installed products for the Project shall comply with LEED requirements for multi-attribute optimization.
- D. At least 20 different products from at least five different manufacturers shall have publically released reports that comply with LEED requirements for raw material source and extraction reporting. Self-declared reports by manufacturers shall be valued as one-half of a product.
- E. At least 20 different products from at least five different manufacturers shall comply with LEED requirements for material ingredient reporting.
- F. At least 25 percent, by cost, of the permanently installed products for the Project shall comply with LEED requirements for material ingredient optimization.
- G. At least 25 percent, by cost, of the permanently installed products for the Project shall comply with LEED requirements for product manufacturer supply chain optimization.
- H. Not less than 25 percent of building materials, by cost, shall comply with LEED requirements for leadership extraction practices.
 - 1. Structure and enclosure materials shall not be more than 30 percent, by cost, of the materials used to comply with this requirement.
- I. Extended Producer Responsibility Program: Not less than ten percent of building materials, by cost, shall be manufactured by a participant in an extended producer responsibility program.
- J. Recycled Content: Building materials shall have recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content for Project constitutes a minimum of ten percent of cost of materials used for Project.
 - 1. Cost of postconsumer recycled content plus one-half of preconsumer recycled content of an item shall be determined by dividing weight of postconsumer recycled content plus one-half of preconsumer recycled content in the item by total weight of the item and multiplying by cost of the item.
 - 2. Do not include furniture, plumbing, mechanical and electrical components, and specialty items, such as elevators and equipment, in the calculation.

- K. Certified Wood: Not less than 50 percent, by cost, of wood-based materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001.

2.2 LOW-EMITTING MATERIALS

- A. Paints and Coatings: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 50 g/L.
 3. Dry-Fog Coatings: 150 g/L.
 4. Primers, Sealers, and Undercoaters: 100 g/L.
 5. Rust-Preventive Coatings: 100 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
 8. Clear Wood Finishes, Varnishes: 275 g/L.
 9. Clear Wood Finishes, Lacquers: 275 g/L.
 10. Floor Coatings: 50 g/L.
 11. Shellacs, Clear: 730 g/L.
 12. Shellacs, Pigmented: 550 g/L.
 13. Stains: 100 g/L.
- B. Paints and Coatings: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Adhesives and Sealants: For field applications that are inside the weatherproofing system, adhesives and sealants shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
1. Wood Glues: 30 g/L.
 2. Metal-to-Metal Adhesives: 30 g/L.
 3. Adhesives for Porous Materials (Except Wood): 50 g/L.
 4. Subfloor Adhesives: 50 g/L.
 5. Plastic Foam Adhesives: 50 g/L.
 6. Carpet Adhesives: 50 g/L.
 7. Carpet Pad Adhesives: 50 g/L.
 8. VCT and Asphalt Tile Adhesives: 50 g/L.
 9. Cove Base Adhesives: 50 g/L.
 10. Gypsum Board and Panel Adhesives: 50 g/L.
 11. Rubber Floor Adhesives: 60 g/L.
 12. Ceramic Tile Adhesives: 65 g/L.
 13. Multipurpose Construction Adhesives: 70 g/L.
 14. Fiberglass Adhesives: 80 g/L.
 15. Contact Adhesives: 80 g/L.
 16. Structural Glazing Adhesives: 100 g/L.
 17. Wood Flooring Adhesives: 100 g/L.

18. Structural Wood Member Adhesives: 140 g/L.
 19. Single-Ply Roof Membrane Adhesives: 250 g/L.
 20. Special-Purpose Contact Adhesives (That Are Used to Bond Melamine-Covered Board, Metal, Unsupported Vinyl, Rubber, or Wood Veneer 1/16 Inch or Less in Thickness to Any Surface): 250 g/L.
 21. Top and Trim Adhesives: 250 g/L.
 22. Plastic Cement Welding Compounds: 250 g/L.
 23. ABS Welding Compounds: 325 g/L.
 24. CPVC Welding Compounds: 490 g/L.
 25. PVC Welding Compounds: 510 g/L.
 26. Adhesive Primer for Plastic: 550 g/L.
 27. Sheet-Applied Rubber Lining Adhesives: 850 g/L.
 28. Aerosol Adhesive, General-Purpose Mist Spray: 65 percent by weight.
 29. Aerosol Adhesive, General-Purpose Web Spray: 55 percent by weight.
 30. Special-Purpose Aerosol Adhesives (All Types): 70 percent by weight.
 31. Other Adhesives: 250 g/L.
 32. Architectural Sealants: 250 g/L.
 33. Nonmembrane Roof Sealants: 300 g/L.
 34. Single-Ply Roof Membrane Sealants: 450 g/L.
 35. Other Sealants: 420 g/L.
 36. Sealant Primers for Nonporous Substrates: 250 g/L.
 37. Sealant Primers for Porous Substrates: 775 g/L.
 38. Modified Bituminous Sealant Primers: 500 g/L.
 39. Other Sealant Primers: 750 g/L.
- D. Adhesives and Sealants: For field applications that are inside the weatherproofing system, 90 percent of adhesives and sealants shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. Flooring: Flooring shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- F. Composite Wood: Composite wood, agrifiber products, and adhesives shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
- G. Ceilings, Walls, and Thermal Insulation: Ceilings, walls, and thermal insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 NONSMOKING BUILDING

- A. Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.

3.2 CONSTRUCTION WASTE MANAGEMENT

- A. Comply with Section 017419 "Construction Waste Management and Disposal."

3.3 CONSTRUCTION IAQ MANAGEMENT

- A. Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."
 - 1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Section 015000 "Temporary Facilities and Controls," install MERV 8 filter media at each return-air inlet for the air-handling system used during construction.
 - 2. Replace air filters immediately prior to occupancy.

3.4 IAQ ASSESSMENT

- A. Flush-Out:
 - 1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14,000 cu. ft. (4 300 000 L) of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 deg F (16 deg C) and a relative humidity no higher than 60 percent.
 - a. AHU-1, -2, -3, and -4 shall be utilized for flushout.
 - 2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. (1 070 000 L) of outdoor air per sq. ft. (sq. m) of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. (1.52 L/s per sq. m) of outside air or the design minimum outside-air rate, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14,000 cu. ft./sq. ft. (4 300 000 L/sq. m) of outside air has been delivered to the space.
 - a. AHU-1, -2, -3, and -4 shall be utilized for flushout.

END OF SECTION 018113.14



LEED v4 for BD+C: New Construction and Major Renovation - DRAFT

Project Checklist

Project Name: Garrett Community College

Date: 10-Oct-19

Y ? N

1	0	0	Credit	Integrative Process	1
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2	1	13	Location and Transportation		16
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0	0	16	Credit	LEED for Neighborhood Development Location	16
<i>or</i>					
1	0	0	Credit	Sensitive Land Protection	1
0	0	2	Credit	High Priority Site	2
0	0	5	Credit	Surrounding Density and Diverse Uses	5
0	0	5	Credit	Access to Quality Transit	5
0	0	1	Credit	Bicycle Facilities	1
1	0	0	Credit	Reduced Parking Footprint	1
0	1	0	Credit	Green Vehicles	1

4	3	3	Sustainable Sites		10
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Y			Prereq	Construction Activity Pollution Prevention	Required
1	0	0	Credit	Site Assessment	1
0	0	2	Credit	Site Development - Protect or Restore Habitat	2
1	0	0	Credit	Open Space	1
1	2	0	Credit	Rainwater Management	3
0	1	1	Credit	Heat Island Reduction	2
1	0	0	Credit	Light Pollution Reduction	1

5	1	5	Water Efficiency		11
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Y			Prereq	Outdoor Water Use Reduction	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Building-Level Water Metering	Required
2	0	0	Credit	Outdoor Water Use Reduction	2
2	1	3	Credit	Indoor Water Use Reduction	6
0	0	2	Credit	Cooling Tower Water Use	2
1	0	0	Credit	Water Metering	1

13	3	17	Energy and Atmosphere		33
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Y			Prereq	Fundamental Commissioning and Verification	Required
Y			Prereq	Minimum Energy Performance	Required
Y			Prereq	Building-Level Energy Metering	Required
Y			Prereq	Fundamental Refrigerant Management	Required
6	0	0	Credit	Enhanced Commissioning	6
3	2	13	Credit	Optimize Energy Performance	18
1	0	0	Credit	Advanced Energy Metering	1
1	0	1	Credit	Demand Response	2
0	1	2	Credit	Renewable Energy Production	3
1	0	0	Credit	Enhanced Refrigerant Management	1
1	0	1	Credit	Green Power and Carbon Offsets	2

6	2	5	Materials and Resources		13
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Y			Prereq	Storage and Collection of Recyclables	Required
Y			Prereq	Construction and Demolition Waste Management Planning	Required
2	1	2	Credit	Building Life-Cycle Impact Reduction	5
1	0	1	Credit	Building Product Disclosure and Optimization - EPDs	2
1	0	1	Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1	0	1	Credit	Building Product Disclosure and Optimization - Material Ingredients	2
1	1	0	Credit	Construction and Demolition Waste Management	2

12	2	2	Indoor Environmental Quality		16
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Y			Prereq	Minimum Indoor Air Quality Performance	Required
Y			Prereq	Environmental Tobacco Smoke Control	Required
2	0	0	Credit	Enhanced Indoor Air Quality Strategies	2
2	1	0	Credit	Low-Emitting Materials	3
1	0	0	Credit	Construction Indoor Air Quality Management Plan	1
2	0	0	Credit	Indoor Air Quality Assessment	2
1	0	0	Credit	Thermal Comfort	1
2	0	0	Credit	Interior Lighting	2
1	1	1	Credit	Daylight	3
1	0	0	Credit	Quality Views	1
0	0	1	Credit	Acoustic Performance	1

3	0	3	Innovation		6
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2	0	3	Credit	Innovation	5
1	0	0	Credit	LEED Accredited Professional	1

4	0	0	Regional Priority		4
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1	0	0	Credit	Regional Priority: Specific Credit	1
1	0	0	Credit	Regional Priority: Specific Credit	1
1	0	0	Credit	Regional Priority: Specific Credit	1
1	0	0	Credit	Regional Priority: Specific Credit	1

50	12	48	TOTALS		Possible Points: 110
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Certified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points, Platinum: 80 to 110

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 COMMISSIONING PROCESS

1. The construction manager is responsible for obtaining from contractors all documentation related to the commissioning effort and submitting it to the commissioning authority.
2. All system and equipment startup will be conducted by the respective manufacturers and contractors.
3. Functional and integrated testing shall be performed by the contractors and supervised, witnessed, and verified by the commissioning authority.
4. This specification is to be used in conjunction with all other contract documents. Any discrepancies or conflicts shall be identified, and the Owner and Construction Manager shall be notified in writing. A clarification will then be issued to the appropriate parties and entities.

1.2 SUMMARY

A. Section Includes:

1. General requirements for coordinating and scheduling commissioning activities.
2. Commissioning meetings.
3. Commissioning reports.
4. Use of commissioning process test equipment, instrumentation, and tools.
5. Construction checklists, including, but not limited to, installation checks, startup, performance tests, and performance test demonstration.
6. Commissioning tests and commissioning test demonstration.
7. Adjusting, verifying, and documenting identified systems and assemblies.

B. Related Requirements:

1. Section 011000 "Summary" for Commissioning Authority responsibilities.
2. Section 013300 "Submittal Procedures" for submittal procedure requirements for commissioning process.
3. Section 017700 "Closeout Procedures" for Certificate of Construction-Phase Commissioning Process Completion submittal requirements.
4. Section 017823 "Operation and Maintenance Data" for preliminary operation and maintenance data submittal requirements.
5. Section 230800 "Commissioning of HVAC" for technical commissioning requirements for HVAC.
6. Section 260800 "Commissioning of Electrical Systems" for technical commissioning requirements for electrical systems.

1.3 ALLOWANCES

- A. Labor and management costs for the performance of commissioning process shall be included in the construction costs for the project.

- B. The following shall be included in the commissioning allowance:
 - 1. Equipment and systems installation, startup, and field quality-control testing indicated in the Contract Documents.
 - 2. Test equipment, instrumentation, and tools (including, but not limited to, proprietary test equipment, instrumentation, and tools) required to perform tests.
 - 3. Work to correct commissioning issues.
 - 4. Work to repeat tests when equipment and systems fail acceptance criteria.

1.4 COMPENSATION

- A. If the Architect or the Commissioning Authority performs additional services or incur additional expenses due to actions of Contractor listed in this specification, compensate the Owner to refund the Architect or the Commissioning Authority for such additional services and expenses.
 - 1. Failure to provide timely notice of commissioning activities schedule changes.
 - 2. Failure to meet acceptance criteria for test demonstrations.

1.5 DEFINITIONS

- A. Acceptance Criteria: Threshold of acceptable work quality or performance specified for a commissioning activity, including, but not limited to, construction checklists, performance tests, performance test demonstrations, commissioning tests, and commissioning test demonstrations.
- B. Basis-of-Design Document: A document prepared by Architect that records concepts, calculations, decisions, and product selections used to comply with Owner's Project Requirements and to suit applicable regulatory requirements, standards, and guidelines.
- C. Commissioning Authority/Provider: An entity engaged by Owner, and identified in Section 011000 "Summary," to evaluate Commissioning-Process Work.
- D. Commissioning Plan: A document, prepared by Commissioning Authority, that outlines the organization, schedule, allocation of resources, and documentation of commissioning requirements.
- E. Commissioning: A quality-focused process for verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, and tested to comply with Owner's Project Requirements. The requirements specified here are limited to the construction phase commissioning activities.
- F. Construction-Phase Commissioning-Process Completion: The stage of completion and acceptance of commissioning process when resolution of deficient conditions and issues discovered during commissioning process and retesting until acceptable results are obtained has been accomplished. Owner will establish in writing the date construction-phase commissioning-process completion is achieved.
 - 1. Commissioning process is complete when the Work specified of this Section and related Sections has been completed and accepted, including, but not limited to, the following:
 - a. Completion of tests and acceptance of test results.
 - b. Resolution of issues, as verified by retests performed and documented with acceptance of retest results.

- c. Comply with requirements in Section 017900 "Demonstration and Training."
 - d. Completion and acceptance of submittals and reports.
- G. Owner's Project Requirements: A document that details the functional requirements of a project and the expectations of how it will be used and operated, including Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. This document is prepared either by the Owner or for the Owner by the Architect or Commissioning Authority.
- H. Owner's Witness: Commissioning Authority, Owner's Project Manager, or Architect-designated witness authorized to authenticate test demonstration data and to sign completed test data forms.
- I. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.
- J. Test: Performance tests, performance test demonstrations, commissioning tests, and commissioning test demonstrations.
- K. Sampling Procedures and Tables for Inspection by Attributes: As defined in the Commissioning Plan.

1.6 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s):
- 1. Commissioning Coordinator: A person or entity employed by Contractor to manage, schedule, and coordinate commissioning process.
 - 2. Project superintendent and other employees that Contractor may deem appropriate for a particular portion of the commissioning process.
 - 3. Subcontractors, installers, suppliers, and specialists that Contractor may deem appropriate for a portion of the commissioning process.
 - 4. Appointed team members shall have the authority to act on behalf of the entity they represent.
- B. Members Appointed by Owner:
- 1. Commissioning Authority, plus consultants that Commissioning Authority may deem appropriate for a portion of the commissioning process.
 - 2. Owner representative(s), facility operations and maintenance personnel, plus other employees, separate contractors, and consultants that Owner may deem appropriate for a portion of the commissioning process.
 - 3. Architect, plus employees and consultants that Architect may deem appropriate for a portion of the commissioning process.

1.7 INFORMATIONAL SUBMITTALS

- A. Comply with requirements in Section 013300 "Submittal Procedures" for submittal procedure general requirements for commissioning process.

- B. Commissioning Plan Information:
 - 1. List of Contractor-appointed commissioning team members to include specific personnel and subcontractors performing the various commissioning requirements.
 - 2. Schedule of commissioning activities integrated with the Construction Schedule. Comply with requirements in Section 013200 "Construction Progress Documentation" for the Construction Schedule general requirements for commissioning process.
 - 3. Contractor personnel and subcontractors participating in each test.
 - 4. List of instrumentation required for each test to include identification of parties that will provide instrumentation for each test.

- C. Commissioning schedule. Include commissioning activities in the overall project schedule. Coordinate with the CxA to determine the amount of time to allocate for each assembly or system test. Allow for adequate time to test assemblies and systems prior to substantial completion of the project.
 - 1. In cooperation with the CxA, the contractor shall integrate commissioning activities into the master construction schedule.

- D. Two-week look-ahead schedules provided to the commissioning authority by the general contractor.

- E. Test Reports:
 - 1. Startup Report: Prior to startup of equipment or a system, submit signed, completed construction (pre-functional) checklists and when installation is completed, and equipment has been started submitting signed, completed manufacturer startup reports.
 - 2. Test Data Reports: At the end of each day in which tests are conducted, submit test data for tests performed via CxAlloy clouded-based software.
 - 3. Commissioning Issue Reports: weekly, at the end of each week in which tests are conducted, submit commissioning issue reports for tests for which acceptable results were not achieved.
 - a. Issues are recorded utilizing the CxAlloy software. Issues are assigned to the appropriate party for resolution.
 - 4. Weekly Progress Report: Weekly, at the end of each week in which tests are conducted, submit a progress report.
 - 5. Data Trend Logs: Submit data trend logs at the end of the trend log period.

- F. Construction Checklists:
 - 1. Material checks.
 - 2. Installation checks.
 - 3. Startup procedures, where required.

1.8 CLOSEOUT SUBMITTALS

- A. Commissioning Report:
 - 1. At Construction-Phase Commissioning Completion, include the following:
 - a. Pre-startup reports.
 - b. Approved test procedures.
 - c. Test data forms, completed and signed.
 - d. Progress reports.
 - e. Commissioning issue report log.

- f. Commissioning issue reports showing resolution of issues.
 - g. Correspondence or other documents related to resolution of issues.
 - h. Other reports required by commissioning process.
 - i. List unresolved issues and reasons they remain unresolved and should be exempted from the requirements for Construction-Phase Commissioning Completion.
 - j. Report shall include commissioning work of Contractor.
- B. Request for Certificate of Construction-Phase Commissioning Process Completion.
- C. Operation and Maintenance Data: For proprietary test equipment, instrumentation, and tools to include in operation and maintenance manuals.

1.9 CONTRACTOR RESPONSIBILITIES

- A. Complete all equipment checklists, startup reports and any owner related documentation pertaining to the project and the equipment.
- B. Prepare for the Construction Manager a preliminary schedule for commissioning activities for use by the Commissioning Authority and shall update the schedule as appropriate. Acting through the Construction Manager, the contractor shall notify the Commissioning Authority during the commissioning meetings when commissioning activities not yet performed or not yet scheduled will delay construction. Perform equipment installation and start up.
- C. Confirm completion of the test, adjust and balancing contractor responsibilities, draft report submitted to the design engineer of record and their review completed and the final report accepted. Copy of draft report is to be provided as well to the owner's representative and the CxA.
- D. Control contractor responsibilities completed including graphics and training has been scheduled with the owner's maintenance staff.
- E. Verify the functional readiness of systems to be tested prior to scheduling and demonstrating the functional operational performance.
- F. Correct current Architect/Engineer punch list and Commissioning Authority deficiency items before functional and integrated performance testing can begin. Air and water TAB shall be completed with discrepancies and problems remedied before functional testing of the respective air or water related systems. Conduct functional performance testing in the presence of the CxA.
- G. Correct deficiencies.
- H. Perform functional performance retest if necessary.
- I. Contractor shall provide a minimum of three business day's notice to the owner's representative of any changes in date, time, and location or anticipated duration of start-up and test activities.
- J. Tests that are not performed as scheduled shall be considered a failed test unless a minimum 48 hours' notification of cancellation or rescheduling was received by all parties. Contractor shall reimburse the owner for costs incurred by the owner as the result of failure to provide timely

notice of changes in date, time, location, or anticipated duration of start-up and test activities, including costs associated with the CxA involvement.

- K. At Construction-Phase Commissioning Completion, include the following:
 - a. Pre-startup reports.
 - b. Commissioning issue report log.
 - c. Commissioning issue reports showing resolution of issues.
 - d. Correspondence or other documents related to resolution of issues.
 - e. Other reports required by commissioning process.
 - f. List unresolved issues and reasons they remain unresolved and should be exempted from the requirements for Construction-Phase Commissioning Completion.
 - g. Report shall include commissioning work of Contractor.

- L. Certificate of Readiness.
 - 1. This document will be provided by the Commissioning Authority to each contractor as necessary and verifies the equipment has been installed in accordance of the design documents, is fully operational and ready for the functional test phase.
 - 2. All punch list issues pertaining to the equipment have been addressed and resolved.

- M. Operation and maintenance data.
 - 1. Documents are project specific and include troubleshooting information.
 - 2. Documentation will include emergency operation guidelines too.

1.10 QUALITY ASSURANCE

- 1. Contractors are to be knowledgeable and fully versed in the integration of the equipment. For example, if necessary, scheduling may be required for the BAS Testing Technician and the Boiler startup technician to work together to properly setup the boiler plant.

- B. BAS Testing Technician Qualifications: Technicians to perform BAS construction checklist verification tests, construction checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:
 - 1. Journey level or equivalent skill level with knowledge of BAS, HVAC, electrical concepts, and building operations.
 - 2. Minimum **three years'** experience installing, servicing, and operating systems manufactured by approved manufacturer.
 - 3. International Society of Automation (ISA)-Certified Control Systems Technician (CCST) Level I.
 - 4. This applies to the individual testing technician, not the contactors company.

- C. HVAC Testing Technician Qualifications: Technicians to perform HVAC construction checklist verification tests, construction checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:
 - 1. Journey level or equivalent skill level. Vocational school four-year-program graduate or an Associate degree in mechanical systems, air conditioning, or similar field. Degree may be offset by three years' experience in servicing mechanical systems in the HVAC industry. Generally, required knowledge includes HVAC systems, electrical concepts, building operations, and application and use of tools and instrumentation to measure performance of HVAC equipment, assemblies, and systems.

2. Minimum **three years'** experience installing, servicing, and operating systems manufactured by approved manufacturer.
 3. This applies to the individual testing technician, not the contactors company.
- D. Electrical Testing Technician Qualifications: Technicians to perform electrical Construction Checklist verification tests, Construction Checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:
1. Journey level or equivalent skill level. Vocational school four-year-program graduate or an Associate degree in electrical systems, or similar field. Degree may be offset by three years' experience as an apprentice or a journey-level electrician. Generally, required knowledge includes electrical and HVAC&R concepts, building operations, and application and use of tools and instrumentation to measure performance of electrical equipment, assemblies, and systems.
 2. Minimum **three years'** experience installing, servicing, and operating systems manufactured by approved manufacturer.
 3. This applies to the individual testing technician, not the contactors company.
- E. Plumbing Testing Technician Qualifications: Technicians to perform plumbing construction checklist verification tests, construction checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:
1. Journey level or equivalent skill level with knowledge of plumbing system, electrical concepts, and building operations.
 2. Minimum **three years'** experience installing, servicing, and operating systems manufactured by approved manufacturer.
 3. This applies to the individual testing technician, not the contactors company.
- F. Test Adjust and Balance Technician Qualifications: Technicians to perform BAS construction checklist verification tests, construction checklist verification test demonstrations, Cx tests, and Cx test demonstrations shall have the following minimum qualifications:
1. Journey level or equivalent skill level with knowledge of BAS, HVAC, electrical concepts, and building operations.
 2. Minimum **three years'** experience installing, servicing, and operating systems manufactured by approved manufacturer.
 3. This applies to the individual testing technician, not the contactors company.
- G. Specialty Testing Technician Qualifications: Technicians to perform Cx tests or equipment startups, are suggested to have the following minimum qualifications:
1. This applies to all specialty trades including lighting control systems, elevators or building exteriors for example.
 2. Journey level or equivalent skill level with knowledge of BAS, HVAC, electrical concepts, plumbing concepts and building operations.
 3. Minimum **three years'** experience installing, servicing, and operating systems manufactured by approved manufacturer.
 4. If required, test documents or letters of attendance may be requested for individuals attending training for the installation of the equipment.
 5. This applies to the individual testing technician, not the contactors company.

1.11 COMMISSIONING OVERVIEW

- A. The following provides a brief overview of typical commissioning tasks during construction and general order in which they occur.
1. CxA provides a commissioning plan to outline the commissioning process including the roles and responsibilities of the owner, design professional, and commissioning agent. The plan shall also identify the logistics, schedules and management protocols associated with the commissioning process.
 2. Contractors submit normal comprehensive product and execution submittals as specified.
 3. Design team reviews submittals and returns to contractors. CxA reviews submittals for equipment/systems in the commissioning program simultaneously with design team and submits comments to design team.
 4. Design professional receives and reviews O&M manuals and submittals. The Construction Manager is to copy the CxA to allow their review for conformance to project intent.
 5. Provide documentation through the Construction Manager to the Commissioning Authority for development of pre-installation, installation, check, test, and start-up, and functional and Integrated performance testing procedures, prior to normal O&M manual submittals when practical. This documentation shall include detailed manufacturer installation, start-up, operating, troubleshooting and maintenance procedures; full details of any owner-contracted tests; fan and pump curves; full factory testing reports, if any; and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up and checkout materials shipped inside the equipment and the actual field checkout sheet forms to be used by the factory-trained manufacturer's field technicians shall be submitted to the Commissioning Authority. The Commissioning Authority may request further documentation necessary for the development of functional performance testing and the commissioning process. This data request may be made prior to normal submittals.
 6. CxA completes development of functional performance tests based on submitted documentation and submits to commissioning team for review and comment, approximately one week prior to functional performance testing. Final format of testing protocols, based on review comments, are prepared by CxA and distributed.
 7. The contractor coordinates proper installation of equipment. The contractor coordinates proper testing and balancing of the systems.
 8. Assist in clarifying the proposed operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not enough for writing detailed testing procedures.
 9. Functional performance testing for a system shall be scheduled upon completion of equipment installation, equipment startup, and system testing and balancing. The contractor with responsibility for the functionality of a system demonstrates system functionality to CxA.
 10. CxA compiles final commissioning report recommending acceptance of performance and functionality or recommends remedial action and
 11. Re-testing. The final commissioning report outlines the functional testing procedures, summarizes the results of the functional performance testing, and identifies any outstanding deficiencies.

PART 2 - PRODUCTS

2.1 TESTING EQUIPMENT AND INSTRUMENTATION QUALITY AND CALIBRATION

- A. Test equipment and instrumentation required to perform the commissioning process shall remain the property of Contractor unless otherwise indicated.
- B. Test equipment and instrumentation required to perform commissioning process shall comply with the following criteria:
 - 1. Capable of testing and measuring performance within the specified acceptance criteria.
 - 2. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
 - 3. Be maintained in good repair and operating condition throughout duration of use on Project.
 - 4. Be recalibrated/repared if dropped or damaged in any way since last calibrated.
- C. Proprietary Test Instrumentation and Tools:
 - 1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, shall comply with the following:
 - a. Be calibrated by manufacturer with current calibration tags permanently affixed.
 - b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.
 - c. All system proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

2.2 REPORT FORMAT AND ORGANIZATION

- A. General Format and Organization:
 - 1. Electronic Data: Portable document format (PDF); a single file with outline-organized bookmarks for major and minor tabs and tab contents itemized for specific reports.
- B. Commissioning Report:
 - 1. Include a table of contents and an index to each test.
 - 2. Include major tabs for each Specification Section.
 - 3. Include minor tabs for each test.
 - 4. Within each minor tab, include the following:
 - a. Test specification.
 - b. Checklist reports.
 - c. Completed test procedures.
 - d. Test data forms, completed and signed.

PART 3 - EXECUTION

3.1 CONSTRUCTION CHECKLISTS

- A. Construction checklists cannot modify or conflict with the Contract Documents.
- B. The CxA creates construction checklists based on actual systems and equipment to be included in Project.
 - 1. The construction checklists are completed by the contractor and sub-contractors relevant to the piece of equipment or system.
- C. Material Checks: Compare specified characteristics and approved submittals with materials as received. Include factory tests and other evaluations, adjustments, and tests performed prior to shipment if applicable.
 - 1. Service connection requirements, including configuration, size, location, and other pertinent characteristics.
 - 2. Included optional features.
 - 3. Delivery Receipt Check: Inspect and record physical condition of materials and equipment on delivery to Project site, including agreement with approved submittals, cleanliness, and lack of damage.
 - 4. Installation Checks:
 - a. Location according to Drawings and approved Shop Drawings.
 - b. Configuration.
 - c. Compliance with manufacturers' written installation instructions.
 - d. Attachment to structure.
 - e. Access clearance to allow for maintenance, service, repair, removal, and replacement without the need to disassemble or remove other equipment or building elements. Access coordinated with other building elements and equipment, including, but not limited to, ceiling and wall access panels, in a manner consistent with OSHA fall-protection regulations and safe work practices.
 - f. Utility connections are of the correct characteristics, as applicable.
 - g. Correct labeling and identification.
 - h. Startup Checks: Verify readiness of equipment to be energized. Include manufacturer's standard startup procedures and forms.
- D. Startup: Perform and document initial operation of equipment to prove that it is installed properly and operates as intended according to manufacturer's standard startup procedures, at minimum.
- E. Performance Tests:
 - 1. Static Tests: As specified elsewhere, including, but not limited to, duct and pipe leakage tests, insulation-resistance tests, and water-penetration tests.
 - 2. Component Performance Tests: Tests evaluate the performance of an input or output of components under a full range of operating conditions.
 - 3. System Performance Tests: Test and evaluate performance of systems under a full range of operating conditions and loads.
 - 4. Intersystem Performance Tests: Test and evaluate the interface of different systems under a full range of operating conditions and loads.

3.2 GENERAL EXECUTION REQUIREMENTS

- A. Schedule and coordinate commissioning process with the Construction Schedule.
- B. Perform activities identified in construction checklists, including tests, and document results of actions as construction proceeds.
- C. Perform test demonstrations for Owner's witness. The sampling rate if not defined in the Commissioning Plan will require the Commissioning Authority to demonstrate tests for 100 percent of work to which the test applies.
 - 1. On determination of the sample size, the samples shall be selected randomly by Owner's witness at the time of the test demonstration.
 - 2. Include in the Commissioning Plan a detailed list of the test demonstrations with lot and sample quantities for each test.
- D. Report test data and commissioning issue resolutions.
- E. Schedule personnel to participate in and perform Commissioning-Process Work.
- F. Installing contractors' commissioning responsibilities include, but are not limited to, the following:
 - 1. Operating the equipment and systems they install during tests.
 - 2. In addition, installing contractors may be required to assist in tests of equipment and systems with which their work interfaces.

3.3 COMMISSIONING AUTHORITY RESPONSIBILITIES

- A. Management and Coordination: Manage, schedule, and coordinate commissioning process, including, but not limited to, the following:
 - 1. Coordinate with subcontractors on their commissioning responsibilities and activities.
 - 2. Obtain, assemble, and submit commissioning documentation.
 - 3. Conduct periodic on-site commissioning meetings per the project scope.
 - 4. Develop and maintain the commissioning schedule. Work with the contractor to integrate commissioning schedule into the Construction Schedule.
 - 5. Report inconsistencies and issues in system operations.
 - 6. Verify that tests have been completed and results comply with acceptance criteria, and that equipment and systems are ready before scheduling test demonstrations.
 - 7. Direct and coordinate test demonstrations.
 - 8. Review training presentations submitted by necessary contractors. Be present during training sessions to witness the training presentations of others. Comply with requirements in Section 017900 "Demonstration and Training."
 - 9. Prepare and submit specified commissioning reports.
 - 10. Track commissioning issues until resolution and retesting is successfully completed.
 - 11. Assemble and submit commissioning report.

3.4 COMMISSIONING MEETINGS

- A. Commissioning Authority will schedule and conduct periodic commissioning meetings as needed for the project. The purpose of these meetings is to review the status of equipment and systems installation and issue resolution. The commissioning meetings include the general contractor, the sub-contractors included but not limited to the building automation contractor, lighting controls contractor, mechanical contractor (sheet metal and hydronic), and electrical contractor.
- B. The contractor and their sub-contractors shall prepare for the Construction Manager a preliminary schedule for commissioning activities for use by the Commissioning Authority and shall update the schedule as appropriate. Acting through the Construction Manager, the contractor and their sub-contractors shall notify the Commissioning Authority during the commissioning meetings when commissioning activities not yet performed or not yet scheduled will delay construction.

3.5 SEQUENCING

- A. Sequencing of Commissioning Verification Activities: For a particular material, item of equipment, assembly, or system, perform the following in the order listed unless otherwise indicated:
 - 1. Construction Checklists:
 - a. Construction checklists are provided by the CxA for completion by the contractor and sub-contractors. These checklists include the following types of information:
 - b. Material checks.
 - c. Installation checks.
 - d. Startup, as appropriate. Some startup may depend on component performance. Such startup may follow component performance tests on which the startup depends.
 - e. Performance Tests:
 - 1) Static tests, as appropriate.
 - 2) Component performance tests. Some component performance tests may depend on completion of startup. Such component performance tests may follow startup.
 - 3) System performance tests.
 - 2. Commissioning tests are directed and witnessed by the CxA and executed by the controls sub-contractor with assistance as needed by the installing sub-contractors.
- B. Before performing commissioning tests, verify that materials, equipment, assemblies, and systems are delivered, installed, started, and adjusted to perform according to construction checklists.
- C. Verify readiness of materials, equipment, assemblies, and systems by performing tests prior to performing test demonstrations. **Notify Architect, CxA, and Owner if acceptable results cannot be achieved due to conditions beyond Contractor's control or responsibility.**
- D. Test and Balance must be completed prior to the commencement of functional testing. Provide a preliminary TAB report to the CxA when complete.

- E. **Building automation systems programming and graphics must be complete prior the commencement of functional testing.** Controls contractor shall complete point to point checkout of the building automation system and provide documentation checklist indicating that the point to point checks have been completed. Point to point checks will be randomly reviewed by the CxA. If more than 50% of the points are not verified, the controls contractor shall repeat the point to point testing prior to the commencement of functional testing.
- F. Prior to scheduling and execution of the performance tests, the contractor / sub-contractor may be requested to complete a Certificate of Readiness to confirm the equipment is ready to test and all punch list items have been addressed.
- G. Commence tests as scheduled and after installation checks for materials, equipment, assemblies, or systems are satisfactorily completed. Tests of a particular system may proceed prior to completion of other systems, provided the incomplete work does not interfere with successful execution of test.

3.6 SCHEDULING

- A. Commence commissioning process as early in the construction period as possible.
- B. One month prior to Substantial Completion all major equipment is to the installation completed, started by a manufacturer representative and all systems fully functional to allow the Test and Balance and Building Automation Systems contractors to allow Functional Testing to be conducted and allow sufficient time for corrections if necessary prior to building handover.
- C. **Test and Balance must be completed prior to the commencement of functional testing.** Provide a preliminary TAB report to the CxA when complete.
- D. **Building automation systems programming and graphics must be complete prior the the commencement of functional testing.** Controls contractor shall complete point to point checkout of the building automation system and provide documentation checklist indicating that the point to point checks have been completed. Point to point checks will be randomly reviewed by the CxA. If more than 50% of the points are not verified, the controls contractor shall repeat the point to point testing prior to the commencement of functional testing.
- E. Commissioning Schedule: Integrate commissioning activities into Construction Schedule.
 - 1. Include detailed commissioning activities in monthly updated Construction Schedule and short-interval schedule submittals.
 - 2. Schedule the start date and duration for the following commissioning activities:
 - a. Submittals.
 - b. Preliminary operation and maintenance manual submittals.
 - c. Installation checks.
 - d. Startup, where required.
 - e. Performance tests.
 - f. Performance test demonstrations.
 - 3. Schedule shall include a line item for each installation check, startup, and test activity specific to the equipment or systems involved.

4. The CxA identifies milestones and prerequisites for commissioning process. Show commissioning milestones, prerequisites, and dependencies in monthly updated critical-path-method construction schedule and short-interval schedule submittals.

F. Two-Week Look-Ahead Commissioning Schedule:

1. Two weeks prior to the beginning of tests, submit a detailed two-week look-ahead schedule. Thereafter, submit updated two-week look-ahead schedules weekly for the duration of commissioning process.
2. Two-week look-ahead schedules shall identify the date, time, beginning location, Contractor personnel required, and anticipated duration for each startup or test activity.
3. Use two-week look-ahead schedules to notify and coordinate participation of Owner's witnesses.

G. Owner's Witness Coordination:

1. Coordinate Owner's witness participation via Architect.
2. Notify Architect of commissioning schedule changes at least two work days in advance for activities requiring the participation of Owner's witness.

3.7 CERTIFICATE OF READINESS

A. Certificate of Readiness:

1. Certify systems ready for functional performance testing on a Certificate of Readiness provided by the Commissioning Authority. The Construction Manager shall not permit a contractor to begin functional testing without the signature of the Commissioning Authority, which shall be affixed to the Certificate of Readiness. The Owner and Commissioning Authority are the sole arbiters of system readiness. Costs shall be apportioned as follows:
 - a. The cost for Owner personnel and the Commissioning Authority to reschedule a functional performance test, made necessary because an item certified by a signatory to the Certificate of Readiness to be ready is found incomplete or faulty, shall be charged to the responsible party.
 - b. For a deficiency identified during functional testing, not identified during the static installation inspection, the Owner through the Commissioning Authority shall direct re-testing of the equipment once at no charge for their time. All costs for subsequent retesting shall be charged to the responsible party.
 - c. Items left incomplete by a contractor, and later causing deficiencies or delays during functional testing may result in back charges to the responsible party.

- B. Contractor shall promptly correct deficient conditions and issues discovered during commissioning process. Costs of correcting such deficient conditions and issues, including additional testing and inspections, the cost of uncovering and replacement, and compensation for Commissioning Authority's services and expenses made necessary thereby, shall be at Contractor's expense.

- C. If Architect, Commissioning Authority, other Owner's witness, or Owner's staff perform additional services or incur additional expenses due to actions of Contractor listed below, compensate Owner for such additional services and expenses.

1. Failure to provide timely notice of commissioning activities schedule changes.
2. Failure to meet acceptance criteria for test demonstrations.

3.8 COMMISSIONING TESTING

- A. Quality Control: Construction checklists, including tests, are quality-control tools designed to improve the functional quality of Project. Test demonstrations evaluate the effectiveness of Contractor's quality-control process.
- B. Owner's witness will be present to witness commissioning work requiring the signature of an owner's witness, including, but not limited to, test demonstrations. Owner's project manager will coordinate attendance by Owner's witness with Contractor's published Commissioning Schedule. Owner's witness will provide no labor or materials in the commissioning work. The only function of Owner's witness will be to observe and comment on the progress and results of commissioning process.
- C. Construction Checklists:
 - 1. Complete construction checklists as Work is completed.
 - 2. Distribute construction checklists to installing contractors before they start work.
 - 3. Installers:
 - a. Verify installation using approved construction checklists as Work proceeds.
 - b. Complete and sign construction checklists weekly for work performed during the preceding week.
 - c. Record as an installation compliance issue Work found to be incomplete, inaccessible, at variance with the Contract Documents, nonfunctional, or that does not comply with construction checklists. Record installation compliance issues on the construction checklist at the time they are identified. Record corrective action and how future Work should be modified before signing off the construction checklist.
- D. Test Procedures and Test Data Forms:
 - 1. Test procedures shall define the step-by-step procedures to be used to execute tests and test demonstrations.
 - 2. Test procedures shall be specific to the make, model, and application of the equipment and systems being tested.
 - 3. Completed test data forms are the official records of the test results.
 - 4. Commissioning Authority will provide to Contractor preliminary test procedures and test data forms for performance tests and commissioning tests after approval of Product Data, Shop Drawings, and preliminary operation and maintenance manual.
- E. Performance of Tests:
 - 1. The sampling rate for test demonstrations is 100 percent unless otherwise indicated in the Commissioning Plan.
 - 2. Perform and complete each step of the approved test procedures in the order listed.
 - 3. Record data observed during performance of tests utilizing the CxAlloy application at the time of test performance and when the results are observed.
 - 4. Record test results that are not within the range of acceptable results on commissioning issue report forms in addition to recording the results on approved test procedures.
- F. Performance of Test Demonstration:
 - 1. Notify Owner's witness at least three days in advance of each test demonstration.
 - 2. Perform and complete each step of the approved test procedures in the order listed.

3. Record data observed during performance of test demonstrations on approved data forms at the time of demonstration and when the results are observed.
4. Provide full access to Owner's witness to directly observe the performance of all aspects of system response during the test demonstration. On completion of a test demonstration, sign the completed data form and obtain signature of Owner's witness at the time of the test to authenticate the reported results.
5. False load test requirements are specified in related sections.
 - a. Where false load testing is specified, provide temporary equipment, power, controls, wiring, piping, valves, and other necessary equipment and connections required to apply the specified load to the system. False load system shall be capable of steady-state operation and modulation at the level of load specified. Equipment and systems permanently installed in this work shall not be used to create the false load without Architect's written approval.

G. Deferred Tests:

1. Deferred Test List: Identify, in the request for Certificate of Construction-Phase Commissioning Process Completion, proposed deferred tests or other tests approved for deferral until specified seasonal or other conditions are available. When approved, deferred tests may be completed after the date of Construction-Phase Commissioning Completion. Identify proposed deferred tests in the request for Certificate of Construction-Phase Commissioning Process Completion as follows:
 - a. Identify deferred tests by number and title.
 - b. Provide a target schedule for completion of deferred tests.
2. Schedule and coordinate deferred tests. Schedule deferred tests when specified conditions are available. Notify Architect and Commissioning Authority at least three working days (minimum) in advance of tests.
3. Where deferred tests are specified, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule deferred tests to minimize occupant and facility impact. Obtain Architect's approval of the proposed schedule.

H. Commissioning Compliance Issues:

1. Test results that are not within the range of acceptable results are commissioning compliance issues.
2. Track and report commissioning compliance issues until resolution and retesting are successfully completed.
3. If a test demonstration fails, determine the cause of failure. The Commissioning Team shall provide timely resolution of issue and then repeat the demonstration. If a test demonstration must be repeated due to failure caused by Contractor work or materials, the responsible contractor will reimburse the Owner for billed costs explained previously for the participation in the repeated demonstration.
4. Test Results: If a test demonstration fails to meet the acceptance criteria, perform the following:
 - a. Document the issue in the Commissioning Issue Log.
 - b. Determine the cause of the failure.
 - c. Establish responsibility for corrective action if the failure is due to conditions found to be Contractor's responsibility.
 - d. Submit notification of issue resolution via the CxAlloy. Retesting shall be scheduled with the CxA when corrective action has been completed.

5. Commissioning Compliance Issue Report: Commissioning Issues are documented utilizing the CxAlloy software. Provide a commissioning compliance issue report for each issue shall be documented utilizing the CxAlloy software. Do not report multiple issues on the same commissioning compliance issue report.
 - a. Resolve commissioning compliance issues promptly.
6. The Commissioning Team is to diagnose, and correct failed test demonstrations as follows:
 - a. Perform diagnostic tests and activities required to determine the fundamental cause of issues observed.
 - b. Record each step of the diagnostic procedure prior to performing the procedure. Update written procedure as changes become necessary.
 - c. Record the results of each step of the diagnostic procedure.
 - d. Record the conclusion of the diagnostic procedure on the fundamental cause of the issue.
 - e. Determine and record corrective measures.
 - f. Include diagnosis of fundamental cause of issues in commissioning compliance issue report.
7. Retest:
 - a. Schedule and repeat the complete test procedure for each test demonstration for which acceptable results are not achieved. Repeat test demonstration until acceptable results are achieved. Except for issues that are determined to result from design errors or omissions, or other conditions beyond Contractor's responsibility, compensate Owner for direct costs incurred as the result of repeated test demonstrations to achieve acceptable results.
 - b. For each repeated test demonstration, submit a new test data form, marked "Retest."
8. Do not correct commissioning compliance issues during test demonstrations.
 - a. Exceptions will be allowed if the cause of the issue is obvious and resolution can be completed in less than 15 minutes. If corrections are made under this exception, note the deficient conditions on the test data form and issue a commissioning compliance issue report. A new test data form, marked "Retest," shall be initiated after the resolution has been completed.

3.9 COMMISSIONING REPORTS

A. Test Reports:

1. Startup test reports that are required for equipment warranty by the manufacturer shall be completed by the contractor and sub-contractors prior to functional testing. These startup reports are separate from the construction checklists. Both construction checklists and start up reports shall be provided prior to functional testing. Startup reports include observations of the conditions of installation, organized into the following sections:
 - a. Equipment Received Checklist: ERC's, compare contract requirements, approved submittals, and provided equipment. Observe physical condition of equipment prior to installation. Note conditions including, but not limited to, physical damage, corrosion, water damage, or other contamination or dirt.
 - b. Pre-Functional Checklist: Verify components supplied with the equipment, preinstalled or field installed, are correctly installed and functional. Verify external components required for proper operation of equipment correctly installed and

- functional. Note missing, improperly configured, improperly installed, or nonfunctional components.
- c. Summary of Installation Compliance Issues and Corrective Actions: Identify installation compliance issues and the corrective actions for each. Verify that issues noted have been corrected.
 - d. Evaluation of System Readiness for Startup: For each item of equipment for each system for which startup is anticipated, document in summary form acceptable to Owner completion of equipment model verification, preinstallation physical condition checks, preinstallation component verification checks, and completion of corrective actions for installation compliance issues.
2. Testing reports include the following:
- a. Test report are included in the CxAlloy software application and shall be recorded utilizing the application.
 - b. "As-tested" system configuration. Complete record of conditions under which the test was performed, including, but not limited to, the status of equipment, systems, and assemblies; temporary adjustments and settings; and ambient conditions.
 - c. Data and observations, including, but not limited to, data trend logs, recorded during the tests.
 - d. Signatures of individuals performing and witnessing tests.
 - e. Data trend logs accumulated overnight from the previous day of testing.
3. Commissioning Compliance Issue Reports: Utilize the CxAlloy application to report commissioning compliance issues that arise as the result of tests and test demonstrations that do not comply with acceptance criteria. Report only one issue per commissioning compliance issue report. Assign commissioning compliance issue reports to parties responsible for taking corrective action. Identify the following:
- a. Commissioning compliance issue report number.
 - b. Action distribution list.
 - c. Report date.
 - d. Equipment identification and location.
 - e. Briefly describe observations about the performance associated with failure to achieve acceptable results. Identify the cause of failure if apparent.
 - f. Diagnostic procedure or plan to determine the cause (include in initial submittal)
 - g. When issues have been resolved, update and resubmit the commissioning issue report forms by completing Part 2. Identify resolution taken and the dates and initials of the persons making the entries.
 - h. Schedule for retesting.
4. Periodic progress reports include information for tests conducted since the preceding report and the following:
- a. Completed data forms.
 - b. Equipment or system tested, including test number, system or equipment tag number and location, and notation about the apparent acceptability of results.
 - c. Activities scheduled but not conducted per schedule.
 - d. Commissioning compliance issue report log.
 - e. Schedule changes for remaining Commissioning-Process Work, if any.

3.10 CERTIFICATE OF CONSTRUCTION-PHASE COMMISSIONING PROCESS
COMPLETION

- A. When Contractor considers that construction-phase commissioning process, or a portion thereof which Owner agrees to accept separately, is complete, Contractor shall prepare and submit to Owner and Commissioning Authority through Architect a comprehensive list of items to be completed or corrected. Failure to include an item on such list does not alter Contractor's responsibility to complete commissioning process.
- B. Contractor shall promptly correct deficient conditions and issues discovered during commissioning process. Costs of correcting such deficient conditions and issues, including additional testing and inspections, the cost of uncovering and replacement, and compensation for Commissioning Authority's services and expenses made necessary thereby, shall be at Contractor's expense.

END OF SECTION 019113

SECTION 022500 - SUPPORT AND UNDERPINNING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SCOPE

- A. The work covered by this Section includes the furnishing of all materials and equipment and the performing of all labor to complete support and underpinning work as shown on the Contract Drawings and as herein specified or directed by the Engineer.
- B. This work shall include but not be limited to:
 - 1. Furnish all labor, materials, equipment and services necessary for and incidental to the execution and completion of support and underpinning without producing settlement in the existing building structures.

1.3 RELATED SECTIONS

- A. Section 02 32 13, Geotechnical Report, for additional demolition requirements.
- B. Section 03 30 00 Cast-in-Place Concrete

1.4 DEFINITIONS

- A. Furnish all labor, materials, equipment and services necessary for and incidental to the execution and completion of support and underpinning without producing settlement in the existing building structures. Work shall be performed by a Specialty Subcontractor.
- B. Work consists of underpinning for existing structures adjacent to and above new construction and the restoration of those structures to the conditions existing prior to the commencement of support and underpinning operations without producing settlement in the existing building structures.
 - 1. Support includes the facilities required to prevent vertical and lateral movement of existing structures until completion of the underpinning. Include needling, shoring, propping, bracing, cribbing and sheeting.
 - 2. Underpinning includes the permanent construction, designed by the Professional Engineer, which directly transmits existing structure foundation loads to a lower bearing elevation, and which preserves the structures being underpinned. Special attention is drawn to existing walls that will retain earth pressure in the completed structure that originally retained little or no earth. Include forms,

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- reinforcement, concrete, grout and shims.
3. Restoration includes the reconstruction, by repair or replacement, of portions of structures removed or altered by underpinning and supporting operations. Refer to cutting and patching.

1.5 SUBMITTALS

- A. Working and Shop Drawings: Show method, staging and necessary details for the construction of underpinning and supports for each structure on which work is to be accomplished. Show details of shop assemblies when required for restoration of structures.
- B. Computations: Submit design computations to support working and shop drawings.
- C. Support and Restoration: Submit procedures, methods and materials lists for support and restoration for approval prior to starting such work.
- D. Certification: Signed and sealed by a Registered Professional Engineer licensed in the State of Maryland specializing in this type of design and certifying that the underpinning as designed and installed are in compliance with the requirements of the Contract Documents and all governing codes and will not produce settlement in the existing building structures.
 1. The Registered Professional Engineer licensed in the State of Maryland shall schedule sufficient number of visits to the site to enable him to verify that the systems as installed meet the requirements of the Contract Documents.

1.6 QUALITY ASSURANCE

- A. Requirements of regulatory agencies:
 1. Materials and methods provided under this section shall conform to local codes and ordinances and shall be as directed and approved in writing by the Local Building Officials.
- B. Professional Responsibility:
 1. Underpinning shall be selected, designed and supervised by a Registered Professional Engineer licensed in the State of Maryland (hereinafter referred to as the "Underpinning Engineer") employed by the Contractor, and approved by the A/E.
- C. Approved Installers:
 1. Work shall be performed by a Specialty Contractor with a minimum of 5 years of experience with installation of underpinning and shall have completed at least 50 projects.

PART 2 - PRODUCTS

2.1 MATERIALS

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- A. Concrete (for underpinning):
1. Portland Cement: ASTM C-150, Type I - 517 lbs. per cu. yd. minimum
 2. Sand: ASTM C-33.
 3. Coarse Aggregate: ASTM C404; Maximum of 1-1/2" but not more than 3/4 of clear distance between forms and the reinforcing bar and 3/4 of minimum clear spacing between reinforcing bars, and as recommended in ACI-211.
 4. Water: Clean and free from deleterious amounts of acids, alkalis or organic materials.
 5. High Range Water-Reducing Admixture (Super Plasticizer): ASTM C-494, Type F or Type G and contain not more than 0.005% chloride ions.
 6. Air Entraining Admixture: ASTM C-260; Air Content 2% \pm 1%.
 7. Shrinkage-Reducing Admixture:
 - a. "Tetraguard AS20" by Master Builders, Inc
 - b. "Eclipse" by Grace Construction Products
 - c. Rate shall be as required to provide a concrete mix whose volume expands during the curing process.
 8. Water / Cement Ratio W/C = 0.45 maximum
 9. Aggregate / Cement Ratio A/C = 6.0 minimum
 10. Slump: 7" \pm 1"
 11. 3000 psi minimum, 28 day compressive strength
 12. Concrete unit weight: \pm 148 pcf
- B. Reinforcement (for underpinning): As specified in DIVISION 3.
- C. Non-metallic Non-shrink Grout: Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CRD-C588.
1. Manufacturers:
 - a. Master Builders - Masterflow
 - b. U.S. Grout Corp. - Five Star Grout
 - c. Upco Chem. Div., USM Corp. - Upcon
 - d. Castle Chemical Co. - Aguabar Imperial
 - e. Anti-Hydro Waterproofing Co. - A-H Hydraulic Cement
- D. Supports: Props, shores, jacks, needles, braces, sheeting, cribbing, etc., shall be materials standard with and available to the Contractor, which are of proper size and are in good serviceable condition. Materials that are unsuitable for the intended purpose, or which are severely damaged, shall not be used.
- E. Materials and Techniques: Contractor's option, as approved; however, underpinning shall be accomplished in such a manner as not to produce settlement in the existing building structures.

PART 3 - EXECUTION

3.1 DETENTION OF MOVEMENT

- A. Inscribe or firmly affix bench marks on walls to be underpinned at locations as

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approved by the Underpinning Engineer. The methods used are optional, but shall be capable of being read to an accuracy of 0.005 feet.

- B. Take readings continually during excavation and support operations under the existing structure.
- C. Stop work, notify the Underpinning Engineer and take immediate remedial action if movement of greater than 0.1 inches of the existing structure occurs during progress of the work.
- D. Upon completion of underpinning of an existing structure, take daily readings of the measurement point for a period of 30 days, and report the results to the Underpinning Engineer.

3.2 PREPARATION

- A. Inspection: Examine the areas and conditions under which this work is to be installed, and notify the Underpinning Engineer in writing of conditions detrimental to the proper and timely completion of the work.
- B. Provisions for support: Perform all required cutting and drilling in connection with this work.
- C. Protection: During the progress of the work, the Contractor shall protect the occupants and contents of the existing buildings from damage or injury. The Contractor shall confer with the Underpinning Engineer and make arrangements with the Owner for his removal or protection of any building contents and personnel which may be affected by this work, or which are especially vulnerable to damage or injury.

3.3 SUPPORT INSTALLATION

- A. Install supports where necessary to temporarily support structures to be underpinned and those which will be affected by underpinning and restoration work.
 - 1. Responsibility: The methods of needling and shoring shall be as selected and designed by the Contractor and the Underpinning Engineer, and subject to the review of the A/E. The Contractor and Underpinning Engineer shall be fully responsible for any damage to existing construction or new construction, or for injury to persons due to any neglect in installing adequate braces and supports for construction and excavations. The responsibility for the performance of shoring methods and devices, including slopes, if any, shall lie entirely with the Contractor and Underpinning Engineer.
- B. All walls, piers, columns, beams and slabs shall be properly braced and supported as necessary to prevent any improper deflection or misalignment during the course of normal construction, abnormal loading, the placement of fill or backfill, etc.
- C. The sides of excavations shall be braced, sheathed or otherwise stabilized as necessary, in the opinion of the Contractor or when directed by the A/E, to prevent the possibility of slides, cave-ins, or other undesirable earth movement.

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- D. The foundation walls and footings of the existing buildings shall also be carefully protected during excavating by sheeting, shoring, or bracings to prevent any possibility of undermining or other disturbance of the present repose, until such time as underpinning is placed.
- E. Supports shall remain in place until such time as construction has sufficiently aged, has been permanently braced and is ready to withstand normal loading, and abnormal loads have been removed. Such removal shall be approved by the A/E. Bracing of excavations shall be removed as the work of filling or backfilling progresses. No props, shores, bracing, sheeting, cribbing, etc., shall be allowed to remain and be buried.

3.4 EARTHWORK

- A. Refer to Section 02 31 50 – Earthwork.

3.5 UNDERPINNING

- A. Sequence: The work of underpinning shall be performed in sections 4'-0" to 5'-0" in width, and in narrower section as conditions are required. Section shall be spaced approximately 12'-0" apart. The method of underpinning shall not produce settlement in the existing building structure.
- B. Size: The width of underpinning shall be equal to the width of the footing or wall to be supported.
Examine the drawings for locations and placement where reinforcing steel is required in underpinning.
- C. Earth Form: Where indicated or allowed by the Engineer, install waterproof paper or board between the earth and the pour to prevent water loss from the fresh concrete.
- D. Concrete Underpinning: Pour in well braced and sheathed pits. Voids occurring in excavations within the existing building and behind the underpinning shall be filled solid with concrete as directed and approved by the Underpinning Engineer.
 - 1. Concrete shall be brought from the elevations shown on the drawings tight to the underside of the construction to be supported.
 - 2. Every effort shall be made to assure that no void occurs in the concrete, and that no space remains between the underpinning and the original building foundation.
- E. Support Removal: Do not remove support of the existing structure until concrete piers, walls or pile caps have attained design strength.

3.6 OPTIONAL METHODS

- A. Contractor shall change methods of underpinning with the approval of the architect to accommodate unforeseen conditions.

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- B. Any suggestion that Contractor may have to expedite work of this Section to promote greater safety, or insure a more practical or efficient installation will be considered for approval.
- C. Contractor is responsible for all phases of work of this Section, regardless of methods specified or used. He shall take all practical precautions to insure the complete safety and sufficiency of the work under this Section and of related or existing work.

3.7 RESPONSIBILITY FOR PERFORMANCE

- A. The responsibility for the performance of the underpinning methods and devices shall lie entirely with the Contractor.
- B. Contractor shall underpin the existing buildings sufficiently to prevent settlement in the existing building structures. If settlement in the existing building structures occurs, the Contractor shall at no additional cost to the Owner, repair the existing building structure to the satisfaction of the Owner.

3.8 DAMAGE

- A. Any damage to persons, property, structures, or contents, due to settlement, movement, or other conditions caused by inadequate support (needling, and shoring) work, shall be made good by the Contractor without any additional cost to the Owner.

3.9 RESTORATION

- A. Restore existing structures to conditions equivalent to those existing prior to the start of underpinning and support work unless otherwise indicated.

3.10 MEASUREMENT AND PAYMENT

- A. Quantities of underpinning concrete piers, walls, caps, etc. shall be determined by the Contractor from the contract drawings and field investigation prior to the submission of the Contractor's bid.
- B. Total amount of underpinning included in the Contractor's bid shall be determined from above information and subsequent field investigations. Contractor shall include with his bid the total cubic yardage of concrete underpinning provided along with a unit price for additional concrete underpinning beyond the quoted quantity.
- C. Unit prices shall be provided for Increased and decreased quantities of underpinning concrete piers, walls, and caps shall be provided and measured by the cubic foot. The volume to be measured will be the volume within the cross section of the concrete as indicated, and from the indicated bottom elevation to the actual bottom elevation. Plus or minus 2 inches will be considered within original grading.
- D. Support, restoration and concrete reinforcing will not be measured separated, but will be considered incidental to underpinning construction.

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- E. Underpinning will be paid for at the Contract unit prices for the quantities as determined above.

3.11 TESTING AND INSPECTION

- A. The Contractor shall employ an Inspection Agency approved by the A/E to inspect the support and underpinning operation to assure compliance in all particulars to these specification requirements. The cost of all testing and inspections shall be borne by the Contractor.
- B. Submit copies of all reports indicating conformance and exceptions to contract documents in a timely fashion to General Contractor for distribution to design consultants, owner, subcontractors and other interested parties.
- C. Final Report: The Inspection Agency shall prepare a written report that summarizes the work inspected during the course of the project, and certifies that the work meets the requirements of the contract documents, specifications, and all governing agencies.

END OF SECTION 022500

SECTION 022510 - NEEDLING & SHORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections apply to this section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Needling & shoring of existing buildings prior to and during demolition.
- B. Related Sections:
 - 1. Section 01 10 00 "Summary" for use of the premises and phasing requirements.
 - 2. Section 02 41 16, "Structure Demolition" for additional needling and shoring requirements.

1.3 DEFINITIONS

- A. Furnish all labor, materials, equipment and services necessary for and incidental to the execution and completion of needling and shoring of existing walls, floor and roof framing during demolition of existing building structure without producing damage to adjacent building structures to remain. Work shall be performed by a Specialty Sub-Contractor.
- B. Work consists of needling and shoring of existing structure to be demolished and adjacent structure to remain and the restoration of those structures to the conditions existing prior to the removal of existing walls and framing.
 - 1. Supports include the facilities required to support and prevent movement of existing structures until removal of existing walls and framing are complete.
 - 2. Needling and shoring includes the temporary construction, designed by the Professional Engineer, which directly transmits existing structure foundation, floor and roof loads to a lower bearing elevation, and which preserves the existing structures above.
 - 3. Restoration includes the reconstruction, by repair or replacement, of portions of structures removed or altered by needling, shoring and supporting operations.

1.4 QUALITY ASSURANCE

- A. Requirements of regulatory agencies:
 - 1. Materials and methods provided under this section shall conform to local codes and ordinances and shall be as directed and approved in writing by the local building officials.

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- B. Professional Responsibility:
 - 1. Needling and shoring for all existing structures shall be selected, designed and supervised by a Registered Professional Engineer (hereinafter referred to as the "Construction Engineer") approved by the A/E. Engineering fees shall be paid for by the Contractor.

1.5 SUBMITTALS

- A. Detailed drawings and calculations of proposed materials and methods of installation of needling and shoring.
- B. Certification: Signed and sealed by the Construction Engineer specializing in this type of design and certifying that the needling and shoring as designed and installed are in compliance with the requirements of the Contract Documents and all governing codes and will not produce damage to the existing building structures.
 - 1. The Construction Engineer should schedule sufficient number of visits to the site to enable him to verify that the systems as installed meet the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Concrete (for needling and shoring): Compressive strength of 3,000 psi at the end of 28 days, with a minimum of 5.5 bags of cement per cubic yard of concrete. As specified in DIVISION 3.
- B. Reinforcement (for needling and shoring): As specified in DIVISION 3.
- C. Rolled steel shapes, plates and bars as specified in DIVISION 5.
- D. Wood columns, beams, and studs as specified in Division 6.
- E. Non-metallic Non-shrink Grout: Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CRD C-588.
 - 1. Manufacturers:
 - a. Master Buildings - Masterflow
 - b. U.S. Grout Corp. - Five Star Grout
 - c. Upco Chem. Div., USM Corp. - Upcon
 - d. Castle Chemical Co. - Aguabar Imperial
 - e. Anti-Hydro Waterproofing Co. - A-H Hydraulic
 - f. Cement
- F. Supports: Props, shores, jacks, needles, braces, sheeting, cribbing, etc., shall be materials standard with and available to the Contractor, which are of proper size and are in good serviceable condition. Materials that are unsuitable for the intended purpose, or which are severely damaged, shall not be used.

- G. Materials and Techniques: Contractor's option, as approved; however, needling and shoring shall be accomplished in such a manner as not to produce settlement in the existing building structures.

PART 3 - EXECUTION

3.1 DETECTION OF MOVEMENT

- A. Inscribe or firmly affix bench marks on columns and walls to be needled and shored at locations as approved by the Construction Engineer. The method used is optional, but shall be capable of being read to an accuracy of 0.005 feet.
- B. Take readings daily during removal of existing columns and walls, and installation of new beams and support operations under the existing structure.
- C. Stop work, notify the Construction Engineer and take immediate remedial action if movement of the existing structure occurs during progress of the work.
- D. Upon completion of needling and shoring of the existing structure, take daily readings of the measurement point for a period of 30 days, and report the results to the A/E.

3.2 PREPARATION

- A. Inspection: Examine the areas and conditions under which this work is to be installed, and notify the Construction Engineer in writing of conditions detrimental to the proper and timely completion of the work.
- B. Protection: During the progress of the work, the Contractor shall protect the occupants and contents of the existing buildings from damage or injury. The Contractor shall confer with the Construction Engineer and make arrangements with the Owner for his removal or protection of any building contents and personnel which may be affected by this work, or which are especially vulnerable to damage or injury.

3.3 PROPPING, BRACING, NEEDLING, SHORING ETC

- A. All walls, piers, columns, beams and slabs shall be properly braced and supported as necessary to prevent any improper deflection or misalignment during the course of normal construction and abnormal loading.
- B. Props, jacks, needles, shores, bracing, sheeting, cribbing, etc., shall remain in place until such time as construction has sufficiently aged or has been permanently braced and is ready to withstand normal loading, abnormal loads have been removed, etc., and such removal has been approved by the A/E.
- C. All required cutting and drilling in connection with this work shall be performed by the Contractor, and the Contractor shall be fully responsible for any damage to the existing structure or new construction, or injury to persons due to any neglect in installing adequate braces and

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supports for existing structures.

3.4 OPTIONAL METHODS

- A. Contractor shall change methods of needling and shoring, as approved, to accommodate unforeseen conditions.
- B. Any suggestion that the Contractor may have to expedite work of this Section, to promote greater safety, or insure a more practical or efficient installation will be considered for approval.
- C. Contractor is responsible for all phases of work of this Section, regardless of the methods specified or used. He shall take all practical precautions to insure the complete safety and sufficiency of the work under this Section and of related or existing work.

3.5 RESPONSIBILITY FOR PERFORMANCE

- A. The responsibility for the performance of the needling and shoring methods and devices shall lie entirely with the Contractor.
- B. During the progress of the work, the Contractor shall protect the occupants and contents of the existing buildings from damage or injury.
- C. Contractor shall needle and shore the existing buildings sufficiently to prevent damage to the existing building structures remain. If damage occurs to the existing building structures, the Contractor shall at no additional cost to the Owner, repair the existing building structure to the satisfaction of the Owner.

3.6 DAMAGE

- A. Any damage to persons, property, structures, or contents, due to cracking, movement, failure of other conditions caused by inadequate support (needling and shoring) work, shall be made good by the Contractor without any additional cost to the Owner.

3.7 TESTING AND INSPECTION

- A. The Contractor shall employ an Inspection Agency approved by the A/E to inspect the needling and shoring operation to assure compliance in all particulars to these specification requirements. The cost of all testing and inspections shall be borne by the Contractor.
- B. Submit copies of all reports indicating conformance and exceptions to contract documents in a timely fashion to General Contractor for distribution to design consultants, owner, subcontractors and other interested parties.

- C. Final Report: The Inspection Agency shall prepare a written report that summarizes the work inspected during the course of the project, and certifies that the work meets the requirements of the contract documents, specifications, and all governing agencies.

END OF SECTION 022510

SECTION 024116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 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.
- B. Related Sections:
 - 1. Section 011000 "Summary" for use of the premises and phasing requirements.
 - 2. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.
 - 3. Structure demolition shall be completed in compliance with Section 024116.13 of the City of Baltimore, Department of Public Works, Specifications for Materials, Highways, Bridges, Utilities and Incidental Structures, most recent addition.
 - 4. Section 023213, Geotechnical Report, for additional demolition requirements.
 - 5. Section 022510, "Needling & Shoring" for additional demolition support requirements.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.

1.4 SUBMITTALS

- A. Qualification Data: For qualified refrigerant recovery technician.
- B. Proposed Protection Measures: Submit informational report, including Drawings, that indicates the measures proposed for protecting individuals and property, for

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environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

- C. Schedule of Building Demolition Activities: Indicate the following:
 - 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
 - 2. Temporary interruption of utility services.
 - 3. Shutoff and capping or re-routing of utility services.
- D. Working and Shop Drawings: Show method, staging and necessary details for support of existing structure and de-tensioning of steel tendons.
 - 1. 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.
 - a. Locate tensioned steel tendons and include recommendations for de-tensioning.
 - 2. Submit designed computations to support working and shop drawings.
- E. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- F. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
- G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.
- D. Predemolition Conference: Conduct conference at Project site.
- E. Professional Responsibility: Demolition of existing building framing shall be selected, designed and supervised by a Registered Professional Engineer (hereinafter referred to as the Construction Engineer) employed by the Contractor, and approved by the A/E.

1.6 PROJECT 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. Owner assumes no responsibility for buildings and structures to be demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Contractor before start of the demolition Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify 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.

1.7 COORDINATION

- A. Arrange demolition schedule so as not to interfere with operations of adjacent occupied buildings.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Section 02 32 13 "Geotechnical Report" and Division 30 Section "Earthwork".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
- D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

3.2 PREPARATION

- A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.
- B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished. Reuse existing utilities where required by drawings.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 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.
- C. Existing Utilities: See plumbing and electrical Sections for shutting off, disconnecting, removing, and sealing, or capping or reuse of existing utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.
- D. 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.
 - 1. Strengthen or add new supports when required during progress of demolition.
 - 2. Provide complete shoring of existing building framing as required prior to de-tensioning post-tensioned tendons.
- E. Salvaged Items: Comply with the following:
 - 1. Clean salvaged items of dirt and demolition debris.

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2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to storage area designated by Owner.
5. Protect items from damage during transport and storage.

3.3 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.
- B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
 - a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
- C. 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.
- D. 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.

3.4 DEMOLITION, GENERAL

- 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. Portable fire-suppression devices during flame-cutting operations.
 - 2. Maintain fire watch for at least 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.
 - 5. The Contractor is to proceed with all work in a systematic manner. The Contractor is to cut and remove all unwanted construction by methods to prevent damaging adjacent work or work intended to be retained.
- B. Engineering Surveys: During demolition, perform surveys to detect hazards that may result from building demolition activities.
- C. 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 traffic ways 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. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- D. Repair: The Contractor shall promptly repair all damaged caused to adjacent existing facilities by demolition operations at no cost to the owner. All adjacent areas and existing facilities are to be restored to at least the condition existing prior to the start of the work, unless the Drawings indicate otherwise.
- E. Explosives: Use of explosives is not permitted.

3.5 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. 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.
 - 1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

STRUCTURE DEMOLITION

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- C. Salvage: List of items to be removed and salvaged will be provided by Owner.
- D. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
 - 1. Remove below-grade construction, including basements, foundation walls, and footings, completely.
- E. Existing Utilities: Demolish existing utilities and below-grade utility structures that are within 5 feet outside footprint indicated for new construction. Cap and abandon utilities outside this area.
 - 1. Fill abandoned utility structures with satisfactory soil materials according to backfill requirements in Section 312000 "Earth Moving."
 - 2. Do not damage existing utilities noted to be reused.

3.6 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. 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.

3.7 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction. See Section 017419 "Construction Waste Management and Disposal" for recycling and disposal of demolition waste.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

3.9 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

1. Clean roadways of debris caused by debris transport.

END OF SECTION 024116

**HAZARDOUS MATERIAL ABATEMENT
PROJECT MANUAL**

ISSUED FOR BID AND PERMIT

**GARRETT COLLEGE
BUILDING #700 & #800**

687 Mosser Road,
McHenry, Maryland 21541

Prepared for:



687 Mosser Road
McHenry, Maryland 21541

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BEC Project #MD19159

Draft Date: November 15, 2019

Prepared by:

HAZARDOUS MATERIAL ABATEMENT PROJECT MANUAL

GARRETT COLLEGE
BUILDING #700 & #800
687 Mosser Road,
McHenry, Maryland 21541

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This hazardous material abatement project design document was prepared by:

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GARRETT COLLEGE
BUILDING #700 & #800
 687 Mosser Road,
 McHenry, Maryland 21541

SECTION 1.0 PROJECT DESCRIPTION

It is the intent of this Project Manual to communicate the scope of asbestos abatement removal work at the subject site, necessarily required by Federal & State law prior to commencement of selective renovation within the building. This manual has been prepared for Bidders’ use in preparation of their Bid to complete the asbestos abatement scope of work. This manual delineates performance-based project requirements and is not intended to represent a prescriptive “means and methods” specification dictating to the Bidder exact and precise work processes, practices, and/or procedures to be employed in accomplishment of the work; other than those required by Federal & State law. The definitive asbestos abatement project completion schedule is to be determined (TBD) by the Owner. However, Bidders are advised work may commence immediately upon expiration of the mandatory ten (10) day “asbestos project notification” review period; the asbestos project notification is required to be submitted to the US EPA & State of Maryland authorities, ten (10) days in advance of the desired project start date.

SECTION 2.0 SCHEDULE OF MATERIALS

The following asbestos-containing building construction materials (ACBMs) have been identified Building #700 & #800 on the campus of Garrett College located at 687 Mosser Road, McHenry, Maryland 21541 and are likely to be disturbed in the course of the upcoming renovations. Table A lists these ACBMs, of which will undergo gross removal, in their entirety, in accordance with Federal & State law prior to renovations within the structure:

TABLE A: Asbestos-Containing Building Materials

Building Construction Material	Material Quantity	Type of Asbestos	Asbestos Concentration
Drywall Joint Compound	~ 850 SF	Chrysotile	2.1% -3.6%
TSI Mudded Fittings	~ 334 Fittings	Chrysotile	80%

The following lead containing building construction materials have been identified at Building #700 & #800 on the campus of Garrett College located at 687 Mosser Road, McHenry, Maryland 21541 and are likely to be disturbed in the course of the upcoming renovations. All work activities will be conducted in accordance with Federal & State laws during the course of the project. Table B lists these materials, of which will undergo gross removal, in their entirety, in accordance with Federal & State law prior to renovations within the structure:

TABLE B: Lead Containing Building Materials

Building Construction Material	Material Quantity	Lead (mg/cm ²)
White Closet Shelf Support	~ 3 Shelves	0.3
Red Isolation Valves – Hot & Cold Water Supply Noted on Historical Inspections	Throughout Boiler Room	Presumed

SECTION 3.0 ASBESTOS ABATEMENT – GENERAL REQUIREMENTS

- The quantities of asbestos-containing materials provided in Table A are based upon visual estimates. Asbestos Abatement Contractors are required to verify all quantities.
- The selected Asbestos Abatement Contractor will provide proper notice to all government agencies having jurisdiction over asbestos abatement activities. At a minimum, National Emission Standards for Hazardous Air Pollutants (NESHAP) notification will be submitted to the US EPA and the Maryland Department of the Environment (MDE). Such notices will be in the form of a letter and a completed “Notification of Asbestos Removal or Encapsulation Project” form detailing all requirements as set forth in NESAHP, 40 CFR 61 Subpart M and State of Maryland asbestos regulations. The selected Asbestos Abatement Contractor is responsible for payment of all applicable fees associated with the removal of asbestos within the State of Maryland.
- The selected Asbestos Abatement Contractor is required to submit the “Notification of Abatement, Demolition or Renovation” to US EPA and the State of Maryland ten (10) business days prior to beginning work.
- Copies of the notifications identified above and asbestos abatement permits are required to be submitted to the Owner and the Owner’s Representative; Boggs Environmental Consultants, Inc. (BEC); the Industrial Hygiene (IH) Firm.
- The selected Asbestos Abatement Contractor will furnish proof to the Owner and IH Firm that all employees assigned to this project possess current and valid training and licenses. Asbestos abatement Supervisor and Worker training accreditation, as required under Asbestos Hazard Emergency Response Act (AHERA) and State of Maryland asbestos abatement Supervisor and Worker licenses are required. Such documentation for all Asbestos Abatement Contractor personnel must be present onsite for the duration of the asbestos abatement project.
- A current AHERA Asbestos Abatement Worker and/or Supervisor accreditation and State of Maryland licensing as an Asbestos Worker for each employee working on the project must be presented to the IH Firm prior to initiating site abatement activities. No worker will be permitted to perform asbestos abatement without current accreditation and appropriate licensing. The selected contractor must have at least one (1) employee onsite possessing a valid AHERA Asbestos Abatement Supervisor accreditation and a current Maryland license as an Asbestos Supervisor at all times.
- The selected Asbestos Abatement Contractor must possess a current and valid State of Maryland issued Asbestos Abatement Contractor license. This license must be kept on file at the site and presented to the Owner and IH Firm, prior to initiating abatement activities.
- The selected Asbestos Abatement Contractor must provide proof of current and valid medical examinations of all workers, as required by OSHA regulations prescribed in 29 CFR 1926.1101. At a minimum, the medical examination is required to include a chest X-ray, a medical history with specific reference to respiratory disease, and a pulmonary function test. Contractor shall provide such information to the Owner and IH Firm prior to beginning asbestos removal activities. Copies of these documents must be kept onsite at all times for all employees engaged in abatement activities.
- The selected Asbestos Abatement Contractor must furnish proof that all personnel have received and passed a respirator fit test within six months of any onsite abatement activities; submit same to the Owner and IH Firm.
- Air monitoring of personnel will be performed by the Asbestos Abatement Contractor and requires daily abatement worker personal breathing zone (PBZ) monitoring. The personnel exposure monitoring is to be conducted, in accordance with US OSHA “Asbestos in Construction” standard (29 CFR 1926.1101).
- Personnel exposure monitoring results must be posted within 24 hours of sampling and include name of individual performing personal breathing zone sampling, air sample analyst, and Certificates of Analysis.

SECTION 3.0 ASBESTOS ABATEMENT – GENERAL REQUIREMENTS

- The Asbestos Abatement Contractor will identify “designated work positions” within the work crew as defined by their associated work tasks. Personnel exposure monitoring is required to evaluate, at a minimum, twenty-five percent (25%) of workforce, in accordance with the US OSHA 29 CFR 1926.1101.
- Full 8-Hour workshift personnel exposure monitoring and 30 minute excursion monitoring performed by the Asbestos Abatement Contractor is required. Calculations for 8-Hr Time Weighted Average (TWA) and 30-Minute Excursion Limit concentrations are required. Asbestos Abatement Contractor is required to compare TWA personnel exposure monitoring data to the Permissible Exposure Limit (PEL) and Excursion Limit (EL) listed in US OSHA’s “Respiratory Protection” standard (29 CFR 1910.134).
- Additionally, the Asbestos Abatement Contractor is required to evaluate the “Maximum Use Concentration” associated with the selected respiratory protection equipment and the contaminant atmospheres. This concentration is determined by multiplying the selected respirator’s assigned protection factor (APF) multiplied by the PEL and compared to the personal breathing zone contaminant levels. The Asbestos Abatement Contractor is required to submit a fully detailed report of personnel exposure monitoring findings to the IH Firm.
- The selected contractor must identify the landfill(s) that will receive the asbestos waste and to ensure they are licensed to receive asbestos waste. The Asbestos Abatement Contractor is required to submit copies of all ACM waste disposal manifests to the Owner and the IH FIRM within two (2) working days after receiving the disposal manifests from the landfill. All waste from the removal of ACM must be identified as asbestos-containing or contaminated and recognized as such by the landfill(s). Further information regarding the labeling of asbestos waste is provided later in this project manual.
- Copies of Safety Data Sheets (SDS) for all chemicals scheduled for use on this project (i.e., encapsulants, surfactants, mastic-removing compounds) will be submitted to IH Firm for approval prior to the start of abatement activities. Chemicals will not be approved for use during abatement activities unless the SDSs are on file with the IH Firm. In accordance to OSHA regulations, the Asbestos Abatement Contractor shall keep copies of the SDSs at the job site.
- Copies of the Asbestos Abatement Contractor’s license, all workers, licenses, asbestos permits, and asbestos activity notifications are required to be displayed in one central area at the project site.
- The Asbestos Abatement Contractor is required to submit their asbestos abatement work plan, to include means and methods to be employed during the abatement process, to the IH Firm for review and approval, prior to beginning any work.
- The Asbestos Abatement Contractor will provide a site specific “Health and Safety Plan” in accordance with all applicable local, state and federal safety regulations. The plan must also include detailed information on fall protection and the proposed method of accessing work areas elevated higher than six (6) feet.
- Asbestos Abatement Contractor shall furnish all labor, materials, services, and equipment necessary for the complete removal of ACBMs, including decontamination of work areas.
- Asbestos Abatement Contractor will strictly adhere to all precautions necessary to ensure the health and safety of their workers in accordance with the provisions in US OSHA, US EPA, State of Maryland Department of the Environment, and all local codes. Asbestos Abatement Contractor will also protect the health and safety of building visitors/occupants and/or other contractors working in the structure during the asbestos abatement work.

SECTION 3.0 ASBESTOS ABATEMENT – GENERAL REQUIREMENTS

- The Asbestos Abatement Contractor is solely responsible for monitoring their asbestos workers as specified by US OSHA Asbestos in General Industry (29 CFR 1910.1001), Asbestos in Construction (29 CFR - 1926.1101), and the US OSHA Respiratory Protection Standard (29 CFR 1910.134). Sampling must be performed using the methodology established in Appendix A of 29 CFR 1926.1101. Appropriate respiratory protection is required for Asbestos Abatement Contractor use, in work areas during abatement activities. The level of respiratory protection will be based on OSHA personal air monitoring results, and the minimum respiratory protection used inside work areas during abatement shall be a negative pressure half-face respirator.
- Provide and display asbestos warning signs in all languages required at the job site at every entrance to each Work Area in clearly visible locations indicating that asbestos removal work is being conducted and unauthorized persons should not enter. Signage must use the following legend, in accordance with 29 CFR 1926.1101(k)(7):

DANGER
ASBESTOS CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED
IN THIS AREA

- Disable or isolate the ventilation system or any other system bringing air into or out of the Work Area. Disable system by disconnecting and isolating the HVAC system from the Work Area. Seal all openings in ventilation system or any other system that brings air into or out of the Work Area with two separate layers of 6-mil polyethylene sheeting.
- Seal all openings (critical barriers) to the work area with two separate layers of 6-mil polyethylene sheeting.
- Construct a negatively-pressurized enclosure (NPE) separating the regulated area from adjacent areas of the building that is sufficient to prevent migration of asbestos fibers, dust, debris, odors, fumes, mists, etc. from the Work Area. High Efficiency Particulate Air (HEPA) filtration of the air is required. Work will not commence until the IH FIRM has inspected and has approved of the Work Area enclosure. The Asbestos Abatement Contractor will smoke test any negatively pressurized enclosure constructed prior to each work shift, in the presence of the IH FIRM.

NOTE: Abatement Contractor may elect an alternative NPE containment for pipe fitting abatement work. Alternative NPE containment proposal is required to be submitted for review and approval of the IH Firm.

- All objects remaining in the regulated work area shall be covered with 6-mil polyethylene sheeting that is secured by duct tape.
- Install approved negative air filtration devices (AFDs) with HEPA filters to exhaust air from the Work Area. Negative air filtration units will be of sufficient quantity and capacity to ensure the total air volume is exchanged four (4) times per hour at minimum. Replacement air will enter the work area through the decontamination facility, in order to reduce the possible escape of contaminated air. The exhaust from the negative air filtration units shall be exhausted outside of the building.
- Negative pressure will be established and maintained through the use of HEPA-filter equipped air filtration devices (AFDs). Negative pressure of a minimum of -0.02 column inches of water (“wc) pressure differential, relative to outside pressure, will be maintained within each containment. Verified with an electronic manometer, equipped with real-time, direct display and strip chart recording capabilities (direct-read instrument) to continuously collect and record static air pressure differential (SAPD) measurements.

SECTION 3.0 ASBESTOS ABATEMENT – GENERAL REQUIREMENTS

- The Asbestos Abatement Contractor will provide a three-stage decontamination unit consisting of a serial arrangement of rooms or air locks adjoining the Work Area. The decontamination unit must be supported, at a minimum, by 2x4-inch studs, temporary metal frame or PVC pipe. Each area will be clearly identified and separated from others by plastic sheeting arranged to minimize fiber and air transfer as people pass between areas. Air locks shall have three alternating layers of 6- mil polyethylene sheeting and flaps will be weighted to fall back in place after the passage of workers, bags, or equipment. A minimum of two (2) layers of 6-mil polyethylene shall be used for the walls and floors of all decontamination units constructed onsite.

NOTE: Abatement Contractor may elect an alternative decontamination unit/hygiene facility for pipe fitting abatement work. Alternative decontamination unit/hygiene facility proposal is required to be submitted for review and approval of the IH Firm.

- The Asbestos Abatement Contractor will establish an equipment room or area that is adjacent to the regulated area for the decontamination of employees and their equipment, which shall consist of an area covered by an impermeable drop cloth on the floor or horizontal working surface. Work clothing must be cleaned with a HEPA vacuum before it is removed. All equipment and surfaces of containers filled with ACM must be cleaned prior to removal from the Work Area. The Asbestos Abatement Contractor will provide a shower area in the three-stage decontamination unit located between the equipment and a clean room. The wastewater from the shower will be filtered through a 5-micron filter. It is the Asbestos Abatement Contractor's responsibility to obtain authorization from the local municipality sanitary sewer service provider to discharge filtered water into the sanitary sewer.
- The Owner will provide electrical service to the Work Areas. The Asbestos Abatement Contractor is responsible for provision of ground-fault circuit interrupters for electrical equipment (eg, HEPA filter equipped vacuums/AFDs, portable task lights, airless sprayers, etc.) to be utilized during the work effort.
- The Building Owner will provide access to water for use in the abatement actions. Asbestos Abatement Contractor is responsible for all temporary electrical and water connections necessarily-required to support the work.
- The Asbestos Abatement Contractor shall adhere to all US OSHA and State of Maryland environmental safety regulations including but not limited to fall protection, scaffolds, ladders, hazardous energy, etc. during all work activities. Should the IH FIRM observe any potential safety concerns, BEC shall notify the Owner and work will cease immediately until corrective measures have been executed.
- The Asbestos Abatement Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State and Local regulations related to all aspects of the asbestos abatement project. The Contractor is responsible for providing and maintaining training, accreditations, medical exams, medical records, personal protective equipment (PPE) including respiratory protection and respirator fit testing, as required by applicable Federal, State and Local regulations. The Contractor shall hold the owner and IH Firm harmless for any Contractor failure to comply with any applicable work, packaging, transporting, disposal, safety, health, or environmental requirement on the part of himself, his employees, or his subcontractors. The Contractor will incur all costs of the IH Firm, including all sampling/analytical costs to assure compliance with OSHA/EPA/State requirements related to failure to comply with the regulations applicable to the work.

SECTION 3.0 ASBESTOS ABATEMENT – GENERAL REQUIREMENTS

- Asbestos Abatement Contractor shall remove all designated asbestos-containing materials and associated waste in strict accordance with Federal, State of Maryland, and local regulations. The Asbestos Abatement Contractor will use wet methods and HEPA vacuums when removing and handling ACM. The Asbestos Abatement Contractor shall use vacuum cleaners fitted with HEPA filters to collect asbestos-laden dust and debris. The Asbestos Abatement Contractor shall promptly clean-up and dispose of wastes and debris contaminated with asbestos within the work areas prior to the conclusion of each shift. The Asbestos Abatement Contractor shall “double bag” all waste, twist neck of bags (“goose-neck”), bend over and seal with minimum three wraps of duct tape, and mark with labels prescribed by Section 40 CFR 61.150 of the US EPA regulations, and ship to a US EPA permitted landfill to undergo disposal as asbestos waste within a closed and lined trailer.
- Prohibited Work Practices described in 29 CFR 1926.1101(g)(3)(i) include the following:
 1. High-speed abrasive disk saws not equipped with a HEPA filter.
 2. Compressed air to remove ACM.
 3. Dry sweeping, shoveling, and other dry cleanup of dust and debris.
 4. Employee rotation to reduce employee exposure to asbestos.
- Following completion of gross removal activities, all Work Areas will be cleaned using vacuums fitted with HEPA filters and by wet wiping all substrates with an anti-bacterial disinfectant to address the pigeon excrement.
- Upon completion of the cleaning activities, the environmental consultant will visually inspect the work area. Upon approval of from the environmental consultant the abatement contractor shall be spray all horizontal and vertical surfaces with lock down encapsulant, preferably with a contrasting color.
- The Work Area will be visually inspected for complete removal by the IH FIRM. The Work Area must be free of all visible ACM specified for removal and dust/debris prior to collection of final clearance air samples. Final clearance criteria for each air sample collected within the work area must be less than 0.01 fibers per cubic centimeter (f/cc) as analyzed by Phase Contrast Microscopy (PCM) utilizing the analytical method prescribed by NIOSH #7400.
- If clearance criteria is not achieved in the Work Area, the Asbestos Abatement Contractor shall return at no additional cost to the owner, and conduct necessary re-cleaning/corrective action and submit for a retest (visual inspection/air sampling) by the IH FIRM. The owner has the option to upgrade any final clearance samples that failed by PCM to Transmission Electron Microscopy (TEM).
- Disposal of Asbestos, Asbestos Contaminated Waste, and ACM:
 1. Any container used for temporary storage of asbestos material must be of a closed type, and kept closed and locked to be available only for Waste from the Work Areas.
 2. All asbestos materials designated for disposal shall be wetted and packaged in permanently sealed leak-tight containers in accordance 40 CFR 61.150 and 49 CFR 171 and 172. All ACM disposal bags shall have the following markings:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID BREATHING DUST
CANCER AND LUNG DISEASE HAZARD
RQ – WASTE ASBESTOS
9 – NA – 2212 – 111

SECTION 3.0 ASBESTOS ABATEMENT – GENERAL REQUIREMENTS

3. Asbestos waste must be properly packaged and disposed at of at an approved landfill that accepts asbestos waste. A waste manifest must be signed by the landfill operator and returned to the Owner for their records. A copy of the Waste Manifest must also be submitted to the IH FIRM.
 4. OSHA warning labels will be applied to all disposal bags. Bags shall also be labeled with the name, address, license number of the Contractor, date each bag or container filled, and the location from which the asbestos waste originated.
 5. Before transporting asbestos containing materials, a valid asbestos waste transporter registration/license must be presented to the IH FIRM by the transportation company. Waste hauling vehicles must be clearly marked with asbestos warning signs during loading, transportation, and unloading. The transport vehicle must remain closed during transport.
 6. If rough surfaces or other materials are present in the load that could potentially puncture the asbestos waste containers, the asbestos waste containers will be enclosed in fiber or steel drums during loading, transportation, and unloading operations. In addition, asbestos waste shall not be loaded into or hauled with vehicles using or containing compaction devices.
 7. Comply with all Federal, State of Maryland, and local regulations regarding the disposal of asbestos-containing, asbestos-contaminated, asbestos, or ACM waste.
 8. Only licensed asbestos workers shall move and load asbestos waste.
 9. Upon completion of the project, provide documentation of the proper removal and disposal of asbestos materials in accordance with all applicable Federal and Maryland regulations to the IH FIRM.
- PCM analysis of ambient air samples will be utilized to evaluate the integrity of the work areas and will be collected by the IH FIRM on a daily basis during the asbestos abatement activities. If elevated fiber counts are detected outside of the work areas, the IH FIRM will notify the contractor to improve the containment or work practices to lower fiber counts to acceptable levels outside of the work areas. The owner has the option to submit the failed ambient air samples that failed by PCM to TEM by an outside laboratory to determine if dust concentrations contain asbestos fibers.
 - The collection of air samples for final clearance will be collected by the IH FIRM and will be analyzed by PCM. The owner has the option to upgrade any final clearance samples that failed by PCM to Transmission Electron Microscopy (TEM). If repeated failures are encountered during the final clearance sampling or samples collected outside of the work areas are repeatedly elevated by PCM analysis, the contractor will be held responsible for the payment of such subsequent laboratory analysis.

SECTION 4.0 LEAD PAINT COMPONENT REMOVAL – GENERAL REQUIREMENTS

- The scope of work shall be conducted in accordance with State of Maryland, Department of Environment (MDE); State of Maryland Occupational Safety and Health regulations (MOSH), United States Occupational Safety and Health Administration (US OSHA) regulations, United States Environmental Protection Agency (US EPA), and United States Department of Housing and Urban Development (US HUD) regulations, and all other applicable Federal, State, and Local governmental regulations. Whenever there is a conflict or overlap of the above referenced regulations, the most stringent provisions of the regulations shall apply.
- The Contractor shall conduct Component Removal, utilizing adequate-sized impermeable protective drop cloths at grade for collection of debris and associated wastewater (if any).
- Warning signs shall be posted at the Work Area(s) and around its perimeter at intervals of no more than twenty-five (25) feet upon Abatement Contractor's arrival at the project site and prior to beginning lead abatement preparation activities.

The signs shall be in bold lettering with lettering not smaller than two inches tall such that a person easily may read the following legend:

WARNING:**LEAD PAINT REMOVAL HAZARD****UNAUTHORIZED ENTRY PROHIBITED****NO SMOKING, EATING OR DRINKING ALLOWED IN THE WORK AREA**

- The contractor shall provide all required personal protective equipment (e.g. full body disposable coveralls, hard hats, NIOSH/MSHA approved respirators equipped with HEPA Filter cartridges, and personnel decontamination units) for personnel performing abatement.
- The Contractor is responsible for protection of all mechanical, electrical, and plumbing fixtures and equipment present at the Work Areas from contamination and damage. The Contractor shall be responsible for restoring any damaged fixtures and equipment to original condition and/or the Owner's satisfaction at the completion of the project.
- The Contractor shall provide for the proper clean-up, packaging, labeling, manifesting, placarding, transport, and disposal of all waste.
- The Contractor shall, at a minimum, select an area adjacent to the Work Area for construction of a Wash Station. Wash Station shall consist of hand/face washing facilities, collection and filtration system for wastewater, adequate quantities of potable water, soap, and towels. Additionally, the Contractor shall store HEPA filter equipped vacuum, cleaning cloths, and floor-mopping equipment at the Wash Station dedicated for responding to potential releases of regulated materials.
- Abatement Contractor shall provide temporary worker wash stations equipped with emergency eye wash capability for worker use during the work. Abatement Contractor is at not permitted to use the project site's existing sinks, baths, etc. for worker wash stations.
- Abatement Contractor shall provide for the complete decontamination of Work Areas.

SECTION 4.0 LEAD PAINT COMPONENT REMOVAL – GENERAL REQUIREMENTS

- The Contractor shall be responsible for safekeeping of Work Area and Owner’s property from damage and theft occurring during the project. The Contractor will be responsible for securing the regulated-access Work Area twenty-four (24) hours per day from unauthorized entry for the duration of the project.
- The Contractor shall use due care and caution to prevent damage to adjacent building components during target building component’s removal. Abatement Contractor shall as applicable score the building component’s substrate to relieve any bonding between building component to be removed and adjacent substrates in an effort to limit damage to building components remaining in place. Abatement Contractor shall utilize hand tools and/or power tools as necessary (e.g., hand tools for windows)
- The Contractor shall wet scrape and HEPA vacuum building components where lead-based paint is in poor condition (including cleanup of loose paint chips/debris) prior to beginning building component removal operations.
- The Contractor shall use pry devices, hand tools, and mechanical equipment as necessary to remove building components. Abatement Contractor shall continuously mist the air during removal operations. Abatement Contractor shall utilize HEPA filter equipped vacuums for localized collection of dust and debris generated during small-scale removal operations. Large scale building component removal operations (i.e., wall, ceiling, etc. demolition) located at the interior of the facility shall be conducted under Dust Control conditions (i.e., critical barriers, high volume air filtration devices equipped with HEPA filters, air misting with amended water, and wet-removal methods).
- The Contractor shall temporarily wrap with polyethylene sheeting, as practical and feasible, removed building components (e.g., shelf, pipe valves, etc.) prior to transfer to the waste storage container.
- At no time during demolition operations nor load-out of demolition debris, shall the Contractor be permitted to generate visible dust emissions.
- The Contractor shall be responsible for any damage to adjacent surfaces due to the component removal. The Contractor shall restore and/or repair damaged area to the satisfaction of the Owner.
- At no time shall a worker or other authorized personnel enter the Work Area without proper respiratory protection and protective clothing.
- All persons shall remove all gross contamination, debris, and dust from their disposable suit by completely HEPA vacuuming the suit before leaving the Work Area.
- All persons leaving the Work Area must remove their personal protective equipment (except respirators) at the limits of the caution tape demarcated Work Area. Suits shall be removed “inside out” to minimize the dispersal of lead containing dust.
- All equipment used by the workers inside the Work Area shall be either left in the Work Area or thoroughly decontaminated before being removed from the Work Area. Worker clothing (in addition to the disposable suit) and work footwear (e.g., work boots) shall be left at the Work Area until completion of work. Work Area(s) including Worker Wash Station shall be cleaned of all visible debris and disposable materials daily.
- Workers shall not eat, drink, smoke, chew gum/tobacco and/or remove their respirators in the Work Area. Environmental Consultant and Owner shall direct the Contractor to STOP all removal operations upon observance of persons breaking respiratory protection. Only in cases of life threatening emergency situations shall persons be permitted to break respiratory protection and in this situation, respirators are to be removed for as short duration as possible.

SECTION 4.0 LEAD PAINT COMPONENT REMOVAL – GENERAL REQUIREMENTS

- The Contractor is required to dispose of waste in accordance with the provisions of this Specification section and any or all applicable Federal, State, County, and Local regulations. It shall be the sole responsibility of the qualified Contractor to assure compliance with all laws and regulations relating to disposal. The Contractor shall until analytical results are available (Lead TCLP Sample), segregate and treat all waste materials (including wastewater) as hazardous waste.
- The Contractor is required to submit the proposed “Respiratory Protection Program” (RP Program) to be employed for protection of employees, against exposure of aerosol lead, throughout all phases of the project, including make, model, and MSHA/NIOSH approval numbers of respirators/cartridges to be used.
- The Contractor is required to submit an Occupational Health and Safety Plan (HASP), which includes special precautions and equipment usage for hazardous work areas (i.e., demolition operations, electrical, tripping, fall, collision, etc.) and frequency of jobsite safety meetings.

APPENDIX A

ASBESTOS ABATEMENT PROJECT SUBMITTALS

Pre-Construction Submittals:

- Certificate of Insurances; Comprehensive General Liability, Worker's Compensation, Automotive and Pollution Liability with no exclusions for asbestos, lead, mercury, and mold damages.
- Asbestos Abatement Work Plan
- Health and Safety Plan
- US EPA Region III/State of Maryland Department of the Environment asbestos project notification
- Maryland Contractor's Business License
- Maryland Asbestos Abatement Contractor's license
- US EPA AHERA Asbestos Abatement Supervisor/Worker training certifications
- State of Maryland Asbestos Abatement Supervisor/Worker licenses
- Abatement Supervisor/Workers - Physician's Statement of Worker Capability to Wear Respirator
- Abatement Supervisor/Workers - Respirator Fitness Testing, Qualitative/Quantitative
- Asbestos Waste disposal facility; name, address, US EPA/State permits
- Asbestos Waste Bill-of-Lading, sample
- General Construction Debris (C&D) disposal facility; name, address, US EPA/State permits
- Safety Data Sheet (SDS)
 1. Asbestos Surfactant
 2. Asbestos Encapsulant
 3. Mastic Removal Agent

During The Work Submittals:

- Special Reports; Accidents & Incidents
- Personnel exposure monitoring results
- Asbestos waste manifests

Post Construction-Construction Submittals:

- Special Reports; Accidents & Incidents
- Personnel exposure monitoring results
- Asbestos waste manifests

APPENDIX B

LEAD PROJECT SUBMITTALS

Pre-Construction Submittals:

- Health and Safety Plan
- Copy of training certificate

During The Work Submittals:

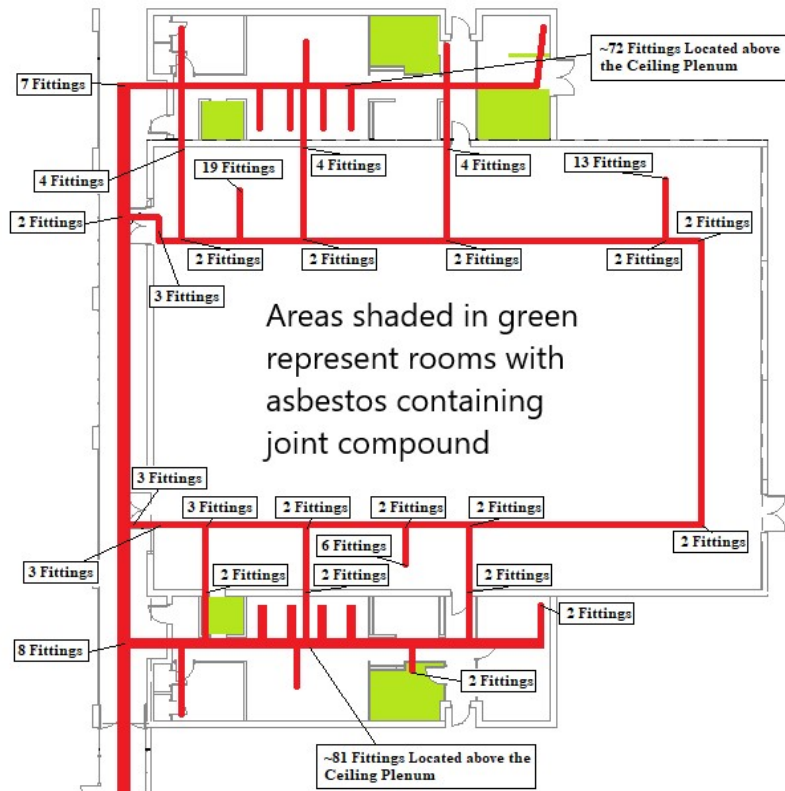
- Special Reports; Accidents & Incidents
- TCLP Results
- Waste manifests

Post Construction-Construction Submittals:

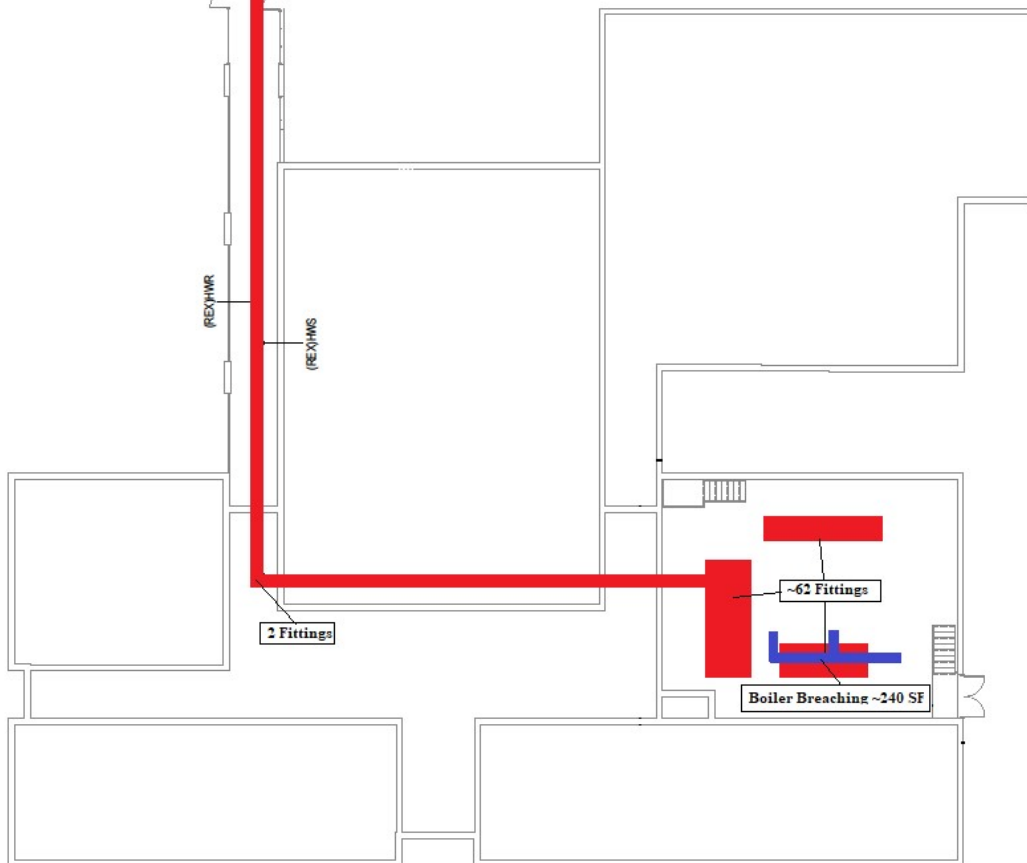
- Special Reports; Accidents & Incidents
- Uniform Hazardous Waste Manifest/US EPA TSD facility receipt
Shipment of “TCLP test-identified” lead hazardous waste (If Applicable)

APPENDIX C

HAZARDOUS MATERIAL LOCATION SCHEMATICS



Garrett College Building #700 & #800 Asbestos Schematic Locations



SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.
 - 4. Suspended slabs.
 - 5. Concrete toppings.
 - 6. Masonry walls.
- B. Related Requirements:
 - 1. Division 31 "Earthwork" for drainage fill under slabs-on-grade.

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 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete mixture. Include alternate mix when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

- D. Formwork: Shop Drawings of typical areas of forms and concrete work shall be submitted prior to fabrication and assembly. Show and coordinate layout and arrangement of construction joints, form panel joints and spacing of wall form ties for the full height of each wall. Review of shop drawings is for general conformance to member dimensional requirements and architectural applications and features only. The design of the formwork for structural stability and sufficiency shall be the Contractor's responsibility. Shop drawings submittal shall be signed and sealed by Professional Engineer registered in the state in which the Project is located. Shop drawing submittal shall include and clearly indicate but not limited to the following:
1. Size, type and quality of form materials including conditions at tops and ends of walls. (If wood is used, indicate species.)
 2. Detailed form construction indicating structural stability and joining including special form joints or reveals required by Contract Documents.
 3. Location and pattern of form tie placement, and other items that affect the appearance of concrete that will remain exposed to view.
 4. Form finish clearly indicating proper locations and full coordination with concrete finishes required by Contract Documents.
 5. The design loads and rate of placing concrete shall be noted on shop drawings.
 6. Product Data: Copies of manufacturers' product data and installation instructions or proprietary materials used in exposed concrete work, including form liners, release agents, manufactured form systems, ties, and accessories.
 7. Compatibility Certification: Contractor shall certify that form release agent used is compatible with subsequent architectural finish materials applied to concrete surfaces. Submit along with manufacturer's data.
 8. Installation Certificate: Contractor shall certify that formwork meets requirements of Contract Documents including allowable tolerances.
 9. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.
 10. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 11. Location of construction joints is subject to approval of the Architect.
- E. Welding certificates: Copies of certificates for welding procedures and personnel.
- F. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
1. Cementitious materials.
 2. Admixtures.
 3. Form materials and form-release agents.
 4. Steel reinforcement and accessories.
 5. Fiber reinforcement.
 6. Waterstops.
 7. Curing compounds.
 8. Floor and slab treatments.
 9. Bonding agents.
 10. Adhesives.
 11. Vapor retarders.

12. Semirigid joint filler.
 13. Joint-filler strips.
 14. Repair materials.
- G. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
1. Aggregates.
- H. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
1. Floor slabs shall be finished to a minimum flatness F-number $F_f=30$ and a minimum levelness F-number $F_l=25$ in any direction (U.N.O.).
 2. Exterior concrete stairs shall have the treads and landings sloped approximately 1/8" per 12" to assure that no water rests on a riser or the landing.
- I. Field quality-control reports.
1. Submit results of compression cylinders and grout cubes.
 2. Test Reports: Including strength and density of furnished product.
 3. Inspection reports: certifying rebar and welded wire fabric placement, etc.
- J. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. 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 formwork and shoring and reshoring installations that are similar to those indicated for this Project in material, design, and extent.
- C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
- D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

- E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- F. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- G. ACI Publications: Comply with the following, unless more stringent provisions are indicated:
 - 1. ACI 301, "Specification for Structural Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
 - 1. Before submitting design mixes, review concrete mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixes.
 - c. Ready-mix concrete producer.
 - d. Concrete subcontractor.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.
 - 1. Avoid damaging coatings on steel reinforcement.
 - 2. Repair damaged epoxy coatings on steel reinforcement according to ASTM D 3963/.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

- a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- G. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- B. Reinforcing Bars: ASTM A 615/, Grade 60, deformed.

- C. Galvanized Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from galvanized steel wire into flat sheets.
- D. Epoxy-Coated Reinforcing Bars: ASTM A 615, Grade 60, deformed bars, ASTM A 775 or ASTM A 934, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.

2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
- B. Joint Dowel Bars: Plain-steel bars, ASTM A 615, Grade 60 . Cut bars true to length with ends square and free of burrs.
- C. Epoxy-Coated Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, ASTM A 775 epoxy coated.
- D. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775.
- E. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I/II supplement with the following which shall not exceed 25% by weight of the total cementitious material:
 - a. Fly Ash: ASTM C 618, Class F or C.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:
 - 1. Class: Severe weathering region, not less than 3S.
 - 2. Nominal Maximum Coarse-Aggregate Size: 1-1/2 inch (3/4 inch maximum for concrete poured on metal deck).
 - 3. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve,

except that less than 8 percent may be retained on coarsest sieve and on No. 50 sieve, and less than 8 percent may be retained on sieves finer than No. 50.

4. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Lightweight Aggregate: ASTM C 330, 3/4 inch nominal maximum aggregate size.
- D. Water: Potable and complying with ASTM C 94.

2.5 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
- D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
- F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.6 VAPOR RETARDERS

- A. Vapor Retarder: polyethylene sheet, ASTM D 4397, not less than 10 mils thick.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

- E. Clear, Solvent-Borne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- I. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Evaporation Retarder:
 - a. Spray-Film; ChemMasters.
 - b. Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
 - c. Sure Film; Dayton Superior Corporation.
 - d. Eucobar; Euclid Chemical Co.
 - e. Vapor Aid; Kaufman Products, Inc.
 - f. E-Con; L&M Construction Chemicals, Inc.
 - g. Confilm; Master Builders, Inc.
 - h. SikaFilm; Sika Corporation.
 - 2. Clear, Solvent-Borne, Membrane-Forming Curing Compound:
 - a. Spray-Cure & Seal 15; ChemMasters.
 - b. Conspec #1-15 percent solids; Conspec Marketing & Manufacturing Co., Inc.
 - c. Day-Chem Cure and Seal; Dayton Superior Corporation.
 - d. Diamond Clear; Euclid Chemical Co.
 - e. L&M Dress & Seal 18; L&M Construction Chemicals, Inc.
 - f. CS-309; W. R. Meadows, Inc.
 - g. Acrylic Cure; Unitex.
 - h. Certi-Vex AC 309; Vexcon Chemicals, Inc.
 - 3. Clear, Waterborne, Membrane-Forming Curing Compound:
 - a. Safe-Cure & Seal 20; ChemMasters.
 - b. High Seal; Conspec Marketing & Manufacturing Co., Inc.
 - c. Safe Cure and Seal; Dayton Superior Corporation.
 - d. Diamond Clear VOX; Euclid Chemical Co.
 - e. SureCure; Kaufman Products Inc.
 - f. Dress & Seal WB; L&M Construction Chemicals, Inc.
 - g. Vocomp-20; W. R. Meadows, Inc.
 - 4. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound:
 - a. Spray-Cure & Seal Plus; ChemMasters.
 - b. Lumiseal Plus; L&M Construction Chemicals, Inc.
 - c. CS-309/30; W. R. Meadows, Inc.
 - 5. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound:
 - a. Polyseal WB; ChemMasters.

- b. Lumiseal WB Plus; L&M Construction Chemicals, Inc.
- c. Vocomp-30; W. R. Meadows, Inc.

2.8 RELATED MATERIALS

- A. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:
 - 1. Type: Class II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
 - 2. Type: Class I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
 - 3. Type: Class IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- C. Reglets: Fabricate reglets of not less than 0.0217-inch thick galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- D. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Topping: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5700 psi at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXES

- A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:
 1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
 2. Proportion lightweight structural concrete according to ACI 211.2 and ACI 301.
- B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings, Grade Beams, Piers, Foundation and Retaining Walls Unless Noted Otherwise: Proportion normal-weight concrete mixture as follows:
 1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Minimum Cementitious Materials Content: 611 lb/cu. yd.
 3. Maximum Water-Cementitious Materials Ratio: 0.45 maximum.
 4. Slump Limit: 4 inches plus or minus 1 inch.
 5. Air Content: Used in concrete exposed to weather. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 5.0 to 7.0 percent, unless otherwise indicated.
- B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
 1. Minimum Compressive Strength: 3500 psi at 28 days.
 2. Minimum Cementitious Materials Content: 517 lb/cu. yd.
 3. Maximum Water-Cementitious Materials Ratio: 0.50 maximum.
 4. Slump Limit: 4 inches plus or minus 1 inch.
 5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
- C. Exterior Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
 1. Minimum Compressive Strength: 3500 psi at 28 days.
 2. Minimum Cementitious Materials Content: 517 lb/cu. yd.
 3. Maximum Water-Cementitious Materials Ratio: 0.45 maximum.
 4. Slump Limit: 4 inches plus or minus 1 inch.
 5. Air Content: Used in concrete exposed to weather. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 5.0 to 7.0 percent, unless otherwise indicated.

- D. Slabs on Deck and Topping Slabs: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3500 psi at 28 days.
 2. Minimum Cementitious Materials Content: 517 lb/cu. yd.
 3. Maximum Water-Cementitious Materials Ratio: 0.45 maximum.
 4. Slump Limit: 3 inches plus or minus 1 inch.
 5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing admixture or high-range water-reducing admixture (super-plasticizer) in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 4. Use corrosion-inhibiting admixture in concrete mixes where indicated.

2.12 MASONRY GROUT MIXTURE

- A. Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3000 psi at 28 days.
 2. Minimum Cementitious Materials Content: 517 lb/cu. yd.
 3. Maximum Water-Cementitious Materials Ratio: 0.60 maximum.
 4. Slump Limit: Water may be introduced at the plant to produce a maximum slump of 6". Additional water may be added at the jobsite immediately prior to placement to produce a maximum slump of 8".
- B. Mix Design: Proportion per the requirements of ASTM C476-83 - "Standard Specification for Grout for Masonry" ready mixed and transported in accordance with ASTM C-94, alternate No. 1 and ACI 304.
- C. Mixing: After introduction of water to the cement and aggregates, concrete which has been mixed longer than 1.5 hours should not be placed. Because of its high slump, ready mix grout shall be continuously agitated after mixing until placement. In no case shall concrete be used that has been mixed so long that the initial set of the concrete shall occur sooner than 15 minutes after placement.

2.13 FABRICATING REINFORCEMENT

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

2.14 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class C, 1/2 inch.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
 - 1. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Do not chamfer corners or edges of concrete.

- J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor bolts, accurately located, to elevations required.
 - 2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:
 - 1. 28-day design compressive strength.
 - 2. At least 70 percent of 28-day design compressive strength.
 - 3. Determine compressive strength of in-place concrete by testing representative field- or laboratory-cured test specimens according to ACI 301.
 - 4. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

- D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

- A. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR RETARDERS

- A. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions.
- B. Granular Fill: Cover vapor retarder with granular fill, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.
 - 1. Place and compact a 1/2-inch thick layer of fine-graded granular material over granular fill.

3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

- E. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Architect.
- C. Before placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mix.
- D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness.

If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

- E. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.
1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- G. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 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.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- H. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total

amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.
 1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
 2. Do not apply rubbed finish to smooth-formed finish.
- C. Rubbed Finish: Apply the following to smooth-formed finished concrete:
 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.
 - 1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes.
- C. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.12 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi-rigid epoxy joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
- B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

- C. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 3. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
 5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
 7. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
 - a. Cast and field cure one set of four standard cylinder specimens for each composite sample.
 8. Compressive-Strength Tests: ASTM C 39; test two laboratory-cured specimens at 7 days and two at 28 days.
 - a. Test two field-cured specimens at 7 days and two at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.
- D. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- E. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- F. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete

testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.

- G. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- H. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

END OF SECTION 033000

SECTION 033543 - POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Polished concrete finishing and scoring.
- 2. Concrete for polished concrete, including concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Section 033000 "Cast-in-Place Concrete."

- B. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" for concrete not designated as polished concrete.

1.3 DEFINITIONS

- A. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of polished concrete.

1.4 PREINSTALLATION MEETINGS

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

- 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with polished concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Cast-in-place concrete subcontractor.
 - e. Polished concrete finishing Subcontractor.
- 2. Review cold- and hot-weather concreting procedures, curing procedures, construction joints, concrete repair procedures, concrete finishing, and protection of polished concrete.

1.5 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Liquid Lithium Silicate Densifier
 - 2. Protective Blanket for finished concrete floors
- B. Polished concrete samples for each Polished Concrete finish required or Field Sample panel (see Quality Assurance).
- C. Polishing Schedule: Submit plan showing polished concrete surfaces and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints.
- D. Qualification Data: For Installer.
- E. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Repair materials.
 - 2. Liquid floor treatments.

1.6 QUALITY ASSURANCE

- A. Field Sample Panels: After approval of verification sample and before casting concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, approximately 48 by 48 inches minimum, to demonstrate the expected range of finish, color, and appearance variations.
 - 1. Locate panels as indicated or, if not indicated, as directed by Architect.
 - 2. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
 - 3. Demolish and remove field sample panels when directed.
- B. Mockups: Before casting concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Demonstrate curing, finishing, and protecting of polished concrete.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - 4. Mockup shall remain through completion of work for use as a quality standard for finished work.
 - 5. Remove mockup when directed.

1.7 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Polished Concrete Environmental Requirements:
 - 1. Schedule placement to minimize exposure to wind and hot sun before curing materials are applied.
 - 2. Avoid placing concrete if rain, snow, or frost is forecast within 24-hours. Protect fresh concrete from moisture and freezing.
 - 3. Comply with professional practices described in ACI 305R and ACI 306R.
- C. Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendations

PART 2 - PRODUCTS

2.1 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Scofield – by Sika (Basis of Design)
 - 1) Formula One Lithium Densifier MP
 - 2) Formula One Guard W Water-based Finishing
 - b. ARDEX Americas.
 - 1) Ardex PC 10
 - 2) Ardex PC Finish
 - c. Prosoco.
 - 1) Consolideck LS
 - 2) PolishGuard
- B. EQUIPMENT
 - 1. Auto Scrubber Machine: For cleaning operations.
 - 2. Hand Grinder or stand-up edger for edge grinding/polishing.

3. Grinding/Polishing Equipment:
 - a. Dry grinding/polishing machines shall include a dust extraction system, including HEPA filtration vacuum.
4. Diamond Segments:
 - a. Use heads from the same manufacturers throughout the entirety of the project.
5. Diamond Heads Types:
 - a. Metal Diamonds: 80 or 150.
 - b. Hybrid Style Diamonds: 50 or 100.
 - c. Resin Bonded, Phenolic Diamonds: 100, 200, 400, 800, 1500, and 3000 (if necessary).
6. Burnishing Machine and Burnishing Pads to produce specified results.
 - a. Burnishing Machine: High speed burnisher, generating pad speeds of 1,500 RPM or higher, as recommended by protective treatment manufacturer. Dust skirt must be installed at time of work.
 - b. Burnishing Pads: as recommended by protective treatment manufacturer.
 - 1) White Burnishing Pad, non-abrasive.
7. Dust extraction system, pre-separator, and squeegee attachments

2.2 PROTECTIVE BLANKET FOR FINISHED FLOOR

PART 3 - EXECUTION

3.1 POLISHING

- A. Cut Level (Depth of cut)
 1. Grade 1 – cream finish
- B. Shine Level
 1. Class 1 – 400 grit polish
- C. Polished concrete Finish Coat
 1. At a distance of 100 feet, the floor will reflect images from side lighting.

- D. Apply polished concrete finish system to cured and prepared slabs to match accepted mockup.
1. Machine grind floor surfaces to receive polished finishes level and smooth and to depth required to reveal aggregate to match approved mockup.
 2. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
 3. Continue polishing with progressively finer-grit diamond polishing pads to gloss level, to match approved mockup.
 4. Control and dispose of waste products produced by grinding and polishing operations.
 5. Neutralize and clean polished floor surfaces.

END OF SECTION 033543

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units.
 - 2. Concrete building brick.
 - 3. Building (common) brick.
 - 4. Mortar and grout.
 - 5. Steel reinforcing bars.
 - 6. Masonry-joint reinforcement.
 - 7. Ties and anchors.
 - 8. Embedded flashing.
 - 9. Miscellaneous masonry accessories.
 - 10. Masonry-cell fill.
- B. Products Installed but not Furnished under This Section:
 - 1. Steel lintels in unit masonry.
 - 2. Steel shelf angles for supporting unit masonry.
 - 3. Cavity wall insulation.
- C. Related Requirements:
 - 1. Section 047200 "Cast Stone Masonry" for cast stone copings.
 - 2. Section 051200 "Structural Steel" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
 - 3. Section 072100 "Thermal Insulation" for cavity wall insulation.
 - 4. Section 076200 "Sheet Metal Flashing and Trim" for sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.
 - 5. Section 321400 "Unit Paving" for exterior unit masonry paving.

1.3 DEFINITIONS

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

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Manufactured within 500 miles of Project site from aggregates and cement extracted and manufactured within 500 miles of Project site.
 - 2. Environmental Product Declaration (EPD): For each product.
- C. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
 - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- D. Samples for Initial Selection:
 - 1. Face brick, in the form of straps of five or more bricks.
 - 2. Colored mortar.
 - 3. Weep holes/cavity vents.
- E. Samples for Verification: For each type and color of the following:
 - 1. Face brick, in the form of straps of five or more bricks.
 - 2. Special brick shapes.
 - 3. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
 - 4. Weep holes and cavity vents.
 - 5. Accessories embedded in masonry.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include data on material properties material and test reports substantiating compliance with requirements.
 - b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - c. For exposed brick, include test report for efflorescence according to ASTM C67.
 - d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

2. Integral water repellent used in CMUs.
 3. Cementitious materials. Include name of manufacturer, brand name, and type.
 4. Mortar admixtures.
 5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 6. Grout mixes. Include description of type and proportions of ingredients.
 7. Reinforcing bars.
 8. Joint reinforcement.
 9. Anchors, ties, and metal accessories.
- C. 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 C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Build mockups for typical exterior and interior walls in sizes approximately 72 inches long by 72 inches high by full thickness, including face and backup wythes and accessories.
 - a. Include a sealant-filled joint at least 16 inches long in each exterior wall mockup.
 - b. Include lower corner of window opening at upper corner of exterior wall mockup. Make opening approximately 12 inches wide by 16 inches high.
 - c. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
 - d. Include metal studs, sheathing, water-resistive barrier sheathing joint-and-penetration treatment air barrier, veneer anchors, flashing, cavity drainage material, and weep holes in exterior masonry-veneer wall mockup.
 - e. Include face brick on one face of interior unit masonry wall mockup.
 2. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
 3. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.

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

1.8 DELIVERY, STORAGE, AND HANDLING

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

1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
 2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

- A. Regional Materials: CMUs shall be manufactured within 100 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners unless otherwise indicated.
- C. Integral Water Repellent: Provide units made with integral water repellent for exposed units and where indicated.
 - 1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
- D. CMUs: ASTM C90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi. based on net cross sectional area; $f'_m=2000$ psi.
 - 2. Density Classification: Medium weight unless otherwise indicated.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 - 4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
 - 5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.5 CONCRETE AND MASONRY LINTELS

- A. General: Provide one of the following unless indicated otherwise:
- B. Concrete Lintels: ASTM C1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.

- C. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Section 032000 "Concrete Reinforcing," and with reinforcing bars indicated.
- D. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.6 BRICK

- A. Regional Materials: Brick shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- B. General: Provide shapes indicated and as follows, with exposed surfaces matching, size, finish and color of exposed faces to match existing adjacent units:
 - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - 3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - 4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- C. Clay Face Brick: Facing brick complying with ASTM C216. Match existing.
 - 1. Grade: SW.
 - 2. Type: FBS.
 - 3. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested according to ASTM C67.
 - 4. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated "not effloresced."
 - 5. Surface Coating: Brick with colors or textures produced by application of coatings shall withstand 50 cycles of freezing and thawing according to ASTM C67 with no observable difference in the applied finish when viewed from 10 feet or shall have a history of successful use in Project's area.
 - 6. Size (Actual Dimensions): Match existing size and coursing.
 - 7. Application: Use where brick is exposed unless otherwise indicated.
 - 8. Where shown to "match existing," provide face brick matching color range, texture, and size of existing adjacent brickwork.
- D. Building (Common) Brick: ASTM C62, Grade SW.
 - 1. Size: Match size of existing brick.
 - 2. Application: Use where brick is indicated for concealed locations. Face brick complying with requirements for grade, compressive strength, and size indicated for building brick may be substituted for building brick.

2.7 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- B. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
 - 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- E. Mortar Cement: ASTM C1329.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Lafarge North America Inc.; Lafarge Mortar Cement or Magnolia Superbond Mortar Cement.
- F. 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.
- G. Colored Cement Products: Packaged blend made from portland cement and hydrated lime, mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Colored Portland Cement-Lime Mix:
 - 1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
 - 2) Holcim (US) Inc. Rainbow Mortamix Custom Color Cement/Lime.
 - 3) Lafarge North America Inc.; Eaglebond Portland & Lime.
 - 4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
 - 2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 - 3. Pigment shall not exceed 10 percent of the portland cement by weight.
 - 4. Pigments shall not exceed 5 percent of mortar cement by weight.
- H. Aggregate for Mortar: ASTM C144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.

4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
 - I. Aggregate for Grout: ASTM C404.
 - J. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Euclid Chemical Company (The); Accelguard BK-80.
 - b. Grace Construction Products, W.R. Grace & Co. – Conn.; Morset.
 - c. Sooneborn Products, BASF Construction Chemicals, LLC; Trimix-NCA.
 - K. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ACM Chemistries; RainBloc for Mortar.
 - b. BASF Construction Chemicals, LLC; Rheopel Mortar Admixture.
 - c. Grace Construction Products, W. R. Grace & Co. – Conn.; Dry-Block Mortar Admixture.
 - L. Water: Potable.
- 2.8 REINFORCEMENT
- A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.
 - B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
 - C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.
 1. Interior Walls: Hot-dip galvanized carbon steel.
 2. Exterior Walls: Hot-dip galvanized carbon steel U.N.O.
 3. Wire Size for Side Rods 0.187-inch diameter.
 4. Wire Size for Cross Rods: 0.187-inch diameter.
 5. Wire Size for Veneer Ties: 0.187-inch diameter.
 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units to be installed at all wall intersections.
 - D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.
 - E. Masonry-Joint Reinforcement for Multiwythe Masonry:

1. Adjustable (two-piece) type, ladder 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.

2.9 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least halfway through veneer but with at least a 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer. Refer to Drawings for wall applications for tie and anchor dimensions.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 1. Mill-Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A641/A641M, Class 1 coating.
 2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
 3. Stainless Steel Wire: ASTM A580/A580M, Type 304.
 4. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, G60 zinc coating.
 5. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
 6. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
 7. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
 8. Stainless Steel Bars: ASTM A276 or ASTM A666, Type 304.
- C. Corrugated-Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.060-inch-thick steel sheet, galvanized after fabrication Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1" of masonry face, made from 0.187-inch diameter, hot-dip galvanized steel wire.
- D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.105-inch- thick steel sheet, galvanized after fabrication
 2. Embedded Section: Dovetail anchor slot in concrete; formed from 0.034 inch- thick steel sheet, galvanized after fabrication.
 3. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized steel wire

4. Partition Top Anchors: 0.105-inch- thick metal plate with a 3/8-inch- diameter metal rod 6 inches 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.
5. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
6. Corrosion Protection: Hot-dip galvanized to comply with ASTM A153/A153M.

E. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that resist tension and compression forces perpendicular to plane of wall, for attachment over insulation and sheathing to metal studs, and as follows:
 - a. Structural Performance Characteristics: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.
2. Fabricate wire ties from 0.187-inch- stainless steel wire unless otherwise indicated.
3. Contractor's Option: Unless otherwise indicated, provide the following type anchors:
 - a. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and an anchor section.
 - b. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Heckman Building Products, Inc.: Pos-i-Tie Thermal Clip System.
 - 2) Hohmann & Barnard Inc.: Thermal 2-Seal Wing Nut Anchor.
 - c. Anchor Section: "T"-shape, plastic wing-type plate with holes in tab that extends past rigid insulation and allows installation of wire pintle type tie/hook connection to brick veneer.
 - d. Wire Ties: Triangular, rectangular or "T"- shaped wire ties fabricated from 3/16-inch diameter, stainless-steel wire.
4. Stainless Steel Drill Screws for Steel Studs: ASTM C954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads; either made from Type 410 stainless steel or made with a carbon-steel drill point and 300 Series stainless steel shank.

2.10 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch thick.
2. Copper: ASTM B370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. weight or 0.0216 inch thick or ASTM B370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. weight or 0.0162 inch thick.
3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.

5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
6. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
7. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
8. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
9. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.
10. Solder metal items at corners.

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

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Advanced Building Products Inc.
 - 2) Carlisle Coatings & Waterproofing Inc.
 - 3) Fiberweb, Clark Hammerbeam Corp.
 - 4) GCP Applied Technologies Inc.
 - 5) Heckmann Building Products, Inc.
 - 6) Hohmann & Barnard, Inc.
 - 7) Polyguard Products, Inc.
 - 8) W.R. Meadows, Inc.
 - 9) Williams Products, Inc.
 - b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
2. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030 inch.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) DuPont Safety and Construction.
 - 2) GCP Applied Technologies Inc.
 - 3) Protecto Wrap Company.
 - 4) Raven Industries, Inc.
 - b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
3. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Hohmann & Barnard, Inc.
 - 2) Hyload, Inc.

- 3) Mortar Net Solutions.
 - b. Monolithic Sheet: Elastomeric thermoplastic flashing, 0.040 inch thick.
 - c. Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch- thick coating of adhesive.
 - d. Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch thick, with a 0.015-inch- thick coating of rubberized-asphalt adhesive. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately 1-1/2 inches from edge.
 - 1) Color: To be selected by Architect from Manufacturer's standard selection.
 - e. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
 4. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D4637/D4637M, 0.040 inch thick.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Carlisle Coatings & Waterproofing Inc.
 - 2) Firestone Specialty Products.
 - 3) Heckmann Building Products, Inc.
 - 4) Hohmann & Barnard, Inc.
- C. Application: Unless otherwise indicated, use the following:
1. Where flashing is indicated to receive counterflashing, use metal flashing.
 2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
 3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge or flexible flashing with a metal drip edge.
 4. Where flashing is fully concealed, use metal flashing or flexible flashing.
- D. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.
- E. Solder and Sealants for Sheet Metal Flashings:
1. Solder for Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
 2. Elastomeric Sealant: ASTM C920, chemically curing silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and remain watertight.
- F. 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.
- G. Termination Bars for Flexible Flashing: Stainless steel bars 0.075 inch by 1 inch.
- H. Termination Bars for Flexible Flashing: Stainless steel sheet 0.019 inch by 1-1/2 inches with a 3/8 inch sealant flange at top.

- I. Termination Bars for Flexible Flashing: Aluminum sheet 0.064 inch by 1-1/2 inches with a 3/8-inch sealant flange at top.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).
- D. Weep/Cavity Vent Products: Use one of the following unless otherwise indicated:
 1. Wicking Material: Absorbent rope, made from cotton or UV-resistant synthetic fiber, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity. Use only for weeps.
 2. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch OD by 4 inches long.
 3. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches long.
 4. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
 5. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.
 6. Vinyl Weep Hole/Vent: Units made from flexible PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color selected by Architect.
- E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
 1. Configuration: Provide one of the following:
 - a. Strips, full depth of cavity and 10 inches high, with dovetail-shaped notches 7 inches deep that prevent clogging with mortar droppings.
 - b. Strips, not less than 1-1/2 inches thick and 10 inches high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.
 - c. Sheets or strips, full depth of cavity and installed to full height of cavity.
 - d. Sheets or strips not less than 1 inch thick and installed to full height of cavity, with additional strips 4 inches high at weep holes and thick enough to fill entire depth of cavity and prevent weep holes from clogging with mortar.

2.12 MASONRY-CELL FILL

- A. Loose-Fill Insulation: Perlite complying with ASTM C549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).
- B. Lightweight-Aggregate Fill: ASTM C331/C331M.

2.13 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned that meets Sustainability Requirements for the Project.

2.14 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime or mortar cement mortar unless otherwise indicated.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- 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 C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
 - 1. For masonry below grade or in contact with earth, use Type M.
 - 2. For reinforced masonry, use Type S
 - 3. For mortar parge coats, use Type S .
 - 4. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; and for other applications where another type is not indicated, use Type S.
 - 5. For other applications where another type is not indicated and interior nonload-bearing partitions, use 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 10 percent of portland cement by weight.
 - 2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.

3. Mix to match existing.
 4. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Clay face brick.
- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
1. Mix to match existing.
 2. Application: Use colored-aggregate mortar for exposed mortar joints with the following units:
 - a. Clay face brick.
- F. Grout for Unit Masonry: Comply with ASTM C476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C476, not less than 3000 psi 28 day compressive strength.
 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.

- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
 - 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 - 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
 - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 - 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
 - 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
 - 7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

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

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern to match existing; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay CMUs as follows:
 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
- B. Lay solid masonry units 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. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 2. Allow cleaned surfaces to dry before setting.
 3. Wet joint surfaces thoroughly before applying mortar.
 4. Rake out mortar joints for pointing with sealant.
- D. Rake out mortar joints to a uniform depth of 1/4 inch and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.
- E. Tool exposed joints to match existing, unless otherwise indicated.
- F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- G. Cut joints flush where indicated to receive waterproofing, cavity wall insulation, and air barriers unless otherwise indicated.

3.6 COMPOSITE MASONRY

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-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties.
- B. Bond wythes of composite masonry together using bonding system indicated on Drawings.
- C. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.
- D. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.
 1. Provide continuity with masonry-joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.
- E. 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 o.c.
 2. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.
 3. Provide rigid metal anchors not more than 24 inches o.c. If used with hollow masonry units, embed ends in mortar-filled cores.

3.7 CAVITY WALLS

- A. Bond wythes of cavity walls together using one of the following methods:
 1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 1.77 sq. ft. of wall area spaced not to exceed 16 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 8 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 16 inches o.c. vertically.
 - a. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) ties.
 - b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) ties to allow for differential movement regardless of whether bed joints align.
- B. Bond wythes of cavity walls together using bonding system indicated on Drawings.
- C. 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.
- D. Parge cavity face of backup wythe in a single coat approximately 3/8 inch thick. Trowel face of parge coat smooth.

- E. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
 - 1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.8 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
 - 1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 - 2. Embed [**tie sections**] in masonry joints.
 - 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 - 4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally, with not less than one anchor for each 1.77 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
- B. Provide not less than 2 inches of airspace between back of masonry veneer and face of sheathing or insulation as indicated in Drawings.
 - 1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.9 MASONRY-CELL FILL

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

3.10 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at[**corners,**] returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.11 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
 - 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally.

3.12 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
 - 4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.
- C. Form expansion joints in brick as follows:
 - 1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
 - 2. Build flanges of factory-fabricated, expansion-joint units into masonry.
 - 3. Build in compressible joint fillers where indicated.
 - 4. Form open joint full depth of brick wythe and of width indicated, for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

- D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.13 LINTELS

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

3.14 FLASHING, WEEP HOLES, AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity 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 multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches, and through inner wythe to within 1/2 inch of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches on interior face.
 - 3. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches, and 1-1/2 inches into the inner wythe. Form 1/4-inch hook in edge of flashing embedded in inner wythe unless indicated otherwise.
 - 4. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under water-resistive barrier or air barrier, lapping at least 4 inches.
 - 5. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 - 6. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.

7. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 8. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
 9. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
 10. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.
- D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- E. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
1. Use specified weep/cavity vent products or open-head joints to form weep holes.
 2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
 3. Space weep holes 24 inches o.c. unless otherwise indicated.
 4. Space weep holes formed from plastic tubing or wicking material 16 inches o.c.
 5. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
 6. Trim wicking material flush with outside face of wall after mortar has set.
- F. Place pea gravel in cavities as soon as practical to a height equal to height of first course above top of flashing, but not less than 2 inches, to maintain drainage.
1. Fill cavities full height by placing pea gravel in cavities as masonry is laid, so that at any point, masonry does not extend more than 24 inches above top of pea gravel.
- G. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.
- H. Install cavity vents in head joints in exterior wythes at spacing indicated. Use specified weep/cavity vent products or open-head joints to form cavity vents.
1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.15 REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 12.67 ft..

3.16 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: Special inspections according to Level applicable to Project as indicated in TMS 402/ACI 530/ASCE 5 and Authorities Having Jurisdiction .
 - 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. of wall area or portion thereof.
- E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C67 for compressive strength.
- F. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.
- G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

- H. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for mortar air content and compressive strength.
- I. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.
- J. Prism Test: For each type of construction provided, according to ASTM C1314 at 7 days and at 28 days.

3.17 PARGING

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

3.18 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.

6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
7. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
8. Clean stone trim to comply with stone supplier's written instructions.
9. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.19 MASONRY WASTE DISPOSAL

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

END OF SECTION 042000

SECTION 042200 - ARCHITECTURAL MASONRY VENEER UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Architectural masonry veneer units.
- B. Related Requirements:
 - 1. Section 042000 "Unit Masonry" for installation of architectural masonry veneer units in conjunction with masonry and flashing.
 - 2. Section 076200 "Sheet Metal Flashing and Trim" for sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.
 - 3. Section 079200 "Joint Sealants" for materials and execution methods for sealing soft joints in architectural masonry veneer work.

1.3 DEFINITIONS

- A. Architectural Stone Veneer: a high-density unit manufactured to match the appearance of fine grain texture and color of natural cut stone. Meets ASTM C 90 requirements.
- B. Dry Cast Concrete Products: Manufactured from zero-slump concrete.
- C. Machine Casting Method: Vibratory compaction by machine of earth-moist, zero-slump concrete against rigid mod until it is densely compacted.

1.4 REFERENCES

- A. ASTM A 615/A 615M - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- B. ASTM A767/A767M - Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
- C. ASTM C 33 - Concrete Aggregates.
- D. ASTM C 90 - Loadbearing Concrete Masonry Units.
- E. ASTM C 140 - Sampling and Testing Concrete Masonry Units and Related Units.

- F. ASTM C 150 - Portland Cement.
- G. ASTM C 270 - Mortar for Unit Masonry.
- H. ASTM C 426 - Linear Drying Shrinkage of Concrete Masonry Units.
- I. ASTM C 494 - Chemical Admixtures for Concrete.
- J. ASTM C 666 - Resistance of Concrete to Rapid Freezing and Thawing.
- K. ASTM C 979 - Pigments for Integrally Colored Concrete.
- L. ACI 530 "Building Code Requirements for Masonry Structures"
- M. ACI 318 – Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International.

1.5 PREINSTALLATION MEETINGS

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

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Environmental Product Declaration (EPD): For each product.
- C. Shop Drawings: Submit manufacturer's shop drawings including elevations, dimensions, layouts, profiles, cross sections, modular unit lengths, reinforcement (if required), exposed faces, arrangement of joints, anchoring methods, anchors, and annotation of architectural stone units, types, and locations. Show locations of special shapes.
- D. Samples for Initial Selection:
 - 1. Architectural masonry veneer units in units not less than 12-inches square that represent general range of texture and color to be used on Project.
 - 2. Colored mortar.
- E. Samples for Verification: For each type and color of the following:
 - 1. Architectural masonry veneer units not less than 12-inches square, that represent general range of texture and color to be used on Project.
 - 2. Colored mortar. Make Samples using same sand and mortar ingredients to be used on Project.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
 - 1. Architectural masonry veneer units.
 - a. Include data on material properties and material test reports substantiating compliance with requirements.
 - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 - 2. Integral water repellent used in CMUs.
 - 3. Cementitious materials. Include name of manufacturer, brand name, and type.
 - 4. Mortar admixtures.
 - 5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 6. Grout mixes. Include description of type and proportions of ingredients.
 - 7. Reinforcing bars.
 - 8. Joint reinforcement.
 - 9. Anchors, ties, and metal accessories.
- C. 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 C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
 - 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm with minimum of 15-years experience in producing architectural masonry veneer units of the types required for the project and:
 - 1. Sufficient plant facilities to provide quality, shapes, quantities, and sizes of architectural stone units required without delaying progress of the Work.
 - 2. Products previously produced by plant and exposed to weather that exhibit satisfactory appearance.
 - 3. Manufacturer shall have an internal Quality Assurance Testing Program with certified laboratory technicians.
 - 4. Design anchors, cast units under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Maryland.

- 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. Provide full-size architectural masonry veneer units for use in construction of mock-ups.
 2. Build mockups using full-size architectural masonry typical exterior wall in sizes approximately and at minimum 96 inches long by 96 inches high by full thickness, including face and backup wythes and accessories.
 - a. Include a sealant-filled joint at least 16 inches long in exterior wall mockup.
 - b. Include lower corner of window opening at upper corner of exterior wall mockup. Make opening approximately 12 inches wide by 16 inches high.
 - c. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
 3. Protect accepted mockups from the elements with weather-resistant membrane.
 4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
1. Deliver architectural stone units secured to shipping pallets and protected from damage and discoloration.
 2. Provide itemized shipping list.
 3. Number each piece individually, as required, to match shop drawings and schedules.
- B. Storage:
1. Store architectural stone units and installation materials in accordance with manufacturer's instructions.
 2. Store architectural stone units on pallets with nonstaining, waterproof covers.
 3. Do not double stack pallets.
 4. Ventilate units under covers to prevent condensation.
 5. Prevent contact with dirt and splashing.
- C. Handling:
1. Protect architectural stone units, including corners and edges, during storage, handling, and installation to prevent chipping, cracking, staining, or other damage.
 2. Handle long units at center and both ends simultaneously to prevent cracking.
 3. Do not use pry bars or other equipment in a manner that could damage units.

1.10 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
 - 2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.
- B. Production Quality Control:
 - 1. Mix Designs: Test new and existing mix designs for applicable compressive strength and absorption compliance before manufacturing architectural masonry veneer units.
 - 2. Plant Production Testing: Tests to be conducted by certified laboratory testing technicians. Test from specimens selected at random from plant production in accordance with ASTM C 140.

2.3 UNIT MASONRY, GENERAL

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

2.4 ARCHITECTURAL MASONRY VENEER UNITS

- A. Regional Materials: CMUs shall be manufactured within 100 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- B. Manufacturer and Product: Subject to Project Requirements, Basis of Design Manufacturer and Product RockCast ST-005 manufactured by Reading Rock, Inc. Cincinnati, Ohio 45246, 800-482-6466, www.readingrock.com.
- C. Dimensions, color and texture to match shapes color and texture of architectural masonry veneer at existing Garrett College STEM Building "Savannah Blend."
- D. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

2. Provide outside corner conditions for units as shown below unless otherwise indicated:
 - a. Exterior Locations: Square-edged.
 - b. Interior Locations: Square-edged.
 - E. Integral Water Repellent: Provide units made with integral water repellent for all units and mortar.
 1. Integral Water Repellent: Standard product accepted by architectural masonry veneer manufacturer within the mix design. Product for mix design and setting mortar to be from the same source. Utilize integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
 - F. Compliance: ASTM C90.
 - G. Test Results: Subject to Project Requirements, units are to meet the following test results:
 1. Compressive Strength, ASTM C 140: Typical RockCast's Architectural Masonry Veneer Series compressive strength range is 3,000 - 5,000 psi at 28 days.
 2. Absorption, ASTM C 140: Typically less than 6 percent at 28 days.
 3. Linear Shrinkage, ASTM C 426: Maximum .065 percent.
 4. Density, ASTM C 140: Typically greater than 120 pounds per cubic foot.
 - H. Curing: Cure in enclosed chamber at 95 percent relative humidity and 95 to 120 degrees F for 12 to 18 hours and yard cure for 350 degree-days.
 - I. Surface Texture: Smooth. Match existing Garrett College STEM building architectural masonry veneer unit texture. Fine-grained texture, similar to natural stone, with no bugholes, air voids, or other surface blemishes visible from a distance of 5-feet.
 - J. Color: Savannah Blend. Match existing Garrett College STEM building architectural masonry veneer unit texture.
- 2.5 ARCHITECTURAL STONE VENEER MATERIALS
- A. Portland Cement: ASTM C 150, Type I or III. White and/or gray as required to match specified color.
 - B. Coarse Aggregates: ASTM C 33, except for gradation. Granite, quartz, or limestone.
 - C. Fine Aggregates: ASTM C 33, except for gradation. Manufactured or natural sands.
 - D. Pigments: ASTM C 979, except do not use carbon black pigments. Inorganic iron oxide pigments.
 - E. Water Reducing, Retarding, and Accelerating Admixtures: ASTM C 494.

- F. Other admixtures: integral water repellents and other chemicals, for which no ASTM Standard exists, shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.
- G. Water: Potable.

2.6 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- B. Mortar and Mortar Materials: ASTM C270, Type N or as recommended by manufacturer for application.
 - 1. Provide colored mortar for exposed architectural masonry veneer units to match color and texture of existing Garrett College STEM Building application unless indicated otherwise.
 - 2. Provide water-repellant in mortar mix.
- C. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- D. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with Architectural Masonry Veneer Units containing integral water repellent from same manufacturer.
- E. Water: Potable.

2.7 REINFORCEMENT

- A. Utilize reinforcement type and materials as recommended by Manufacturer for application.
- B. Uncoated Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.
- C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- D. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A951/A951M.
 - 1. Exterior Walls: Hot-dip galvanized carbon steel or Type 304 stainless steel.
 - 2. Size and Spacing: As recommended by Manufacturer for Application.

2.8 TIES AND ANCHORS

- A. General: As recommended by Manufacturer for application.

- B. Ties and anchors shall extend at least 1-1/2 inches into masonry but with at least a 5/8-inch cover on outside face. Refer to Drawings for wall dimensions for tie applications.
- C. 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 A82/A82M, with ASTM A153/A153M, Class B-2 coating.
 - 2. Stainless Steel Wire: ASTM A580/A580M, Type 304.
 - 3. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
 - 4. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
 - 5. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- D. Adjustable Anchors for Connecting to Structural Steel or Concrete Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, made from hot-dip galvanized steel or stainless steel, in size and configuration required for application.

2.9 EMBEDDED FLASHING MATERIALS

- A. Refer to Section 042000 "Unit Masonry" and Manufacturer's installation instructions for flashing requirements.
- B. Application: Unless otherwise indicated, use the following:
 - 1. Where flashing is indicated to receive counterflashing, use metal flashing.
 - 2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
 - 3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge or flexible flashing with a metal sealant stop.
 - 4. Where flashing is fully concealed, use metal flashing or flexible flashing.
- C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Manufacturer's standard premolded filler strips suitable for application, complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287,

Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. 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.

3.3 INSTALLATION

- A. Install units in conjunction with masonry, as specified in Section 04810.
- B. Pull units from multiple cubes during installation to minimize variation in color and help with natural blending.
- C. Cut units using motor-driven masonry saws. Finished ends should be turned to the visible side and the saw cut turned to the inside of the mortar joint to hide exposed aggregates and saw marks.
- D. Do not use pry bars or other equipment in a manner that could damage units.

- E. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
- F. Use Type N mortar (ASTM C 270), unless specified otherwise.
- G. Per ACI 530.1, it is not necessary, nor recommended, to wet the units prior to installation.
- H. Set units in full bed of mortar, unless otherwise indicated on the drawings.
- I. Fill vertical joints with mortar.
- J. Make joints 3/8 inch, unless otherwise indicated on the drawings.
- K. Tuck point mortar joints to slight concave profile (unless specified otherwise).
- L. Remove excess mortar immediately.
- M. Remove mortar fins and smears before tooling joints.
- N. Cover wainscot for protection with plastic, felt paper or other approved products.
- O. Cover freshly installed masonry products as required to assist with the curing process.
- P. Sealant Joints:
 - 1. As specified in Section 079000.
 - 2. Prime ends of units, insert properly sized backing rod, and install sealant.
 - 3. Provide sealant joints at following locations:
 - a. Joints at relieving angles.
 - b. Control and expansion joints.
 - c. As indicated on the drawings.

3.3 TOLERANCES

- A. Installation Tolerances:
 - 1. Variation from Plumb: Do not exceed 1/8 inch in 5 feet or 1/4 inch in 20 feet or more.
 - 2. Variation from Level: Do not exceed 1/8 inch in 5 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
 - 3. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch or 1/4 of nominal joint width, whichever is greater.
 - 4. Variation in Plane Between Adjacent Surfaces: Do not exceed 1/8-inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.
- B. Joints:
 - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
 - 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
 - 3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.

4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if recommended by Manufacturer before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- H. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 1. Install compressible filler in joint between top of partition and underside of structure above.
 2. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

- A. Set architectural masonry veneer units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 2. Wet joint surfaces thoroughly before applying mortar.
 3. Rake out mortar joints for pointing with sealant.

- B. Rake out mortar joints to a uniform depth of 1/4 inch unless indicated otherwise and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- E. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install masonry joint reinforcement per Manufacturer's instructions for application.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, per Manufacturer's instructions for application.

3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
 2. Install preformed control-joint gaskets designed to fit standard sash block.
 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
 4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

3.9 LINTELS

- A. Where indicated, provide lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 FLASHING

- A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall 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, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 - 3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 - 4. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 - 5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
 - 6. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
 - 7. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.
- D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.11 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.

3.12 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
 - 6. Do not use the following to clean units:
 - a. Muriatic acid.
 - b. Power washing.
 - c. Sandblasting
 - d. Harsh cleaning materials or methods that would damage or discolor surfaces.

3.13 PROTECTION

- A. Protect completed work from damage.
- B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.
- C. Inspect completed installation in accordance with ACI 530 requirements.

3.14 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042200

SECTION 047200 - CAST STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Custom cast-stone trim.
 - a. Copings.
 - b. Sills.
- B. Related Sections:
 - 1. Section 042000 "Unit Masonry."
 - 2. Section 042200 "Architectural Masonry Veneer Units."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For cast-stone units, include dimensions and finishes.
- B. Sustainable Design Submittals:
 - 1. Environmental Product Declaration (EPD): For each product.
- C. 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.
- D. Samples:
 - 1. For each color and texture of cast stone required, submit pieces of manufacturer's cast stone units that represent range of texture and color proposed to be furnished for project.
 - 2. For colored mortar.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. 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. Submit test results from

cast stone units previously made by manufacturer using materials from same sources proposed for use in project.

1.5 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** A qualified manufacturer of cast-stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute the Architectural Precast Association, the Precast/Prestressed Concrete Institute for Group A, Category AT or equivalent certification program.
- B. Custom Cast Stone pieces and architectural masonry veneer pieces are to be made from a similar mix design to match color and texture.
- C. **Warranty:** Submit manufacturer's standard warranty.
- D. **Mockups:** Provide full-size cast stone units for use in construction of mockups. Approved mockups shall become the standard for appearance and workmanship for project. Refer to Division 01 Sections for use of mockups in construction.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Coordinate delivery of cast stone to avoid delaying the Work.
- B. Pack, handle, and ship cast-stone units in suitable packs or pallets. Store cast stone units and installation materials in accordance with manufacturer's instructions.
 - 1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast-stone units if required, using dollies with wood supports.
 - 2. Do not use pry bars or other equipment in a manner that could damage units. Handle long units at center and both ends simultaneously to prevent cracking.
 - 3. Store cast-stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation. Prevent contact with dirt and splashing.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

PART 2 - PRODUCTS

2.1 CAST-STONE UNITS

- A. Basis of Design: Subject to meeting project requirements, Basis of Design manufacturer and product is RockCast's Custom Cast Stone Series, manufactured by Reading Rock, Inc. 4600 Devitt Drive, Cincinnati, Ohio, 800-482-6466, www.readingrock.com.
- B. Subject to meeting project requirements, additional custom cast stone manufacturers may be:
 - 1. Arban Precast Stone, Ltd.
 - 2. Calstar.
- C. Regional Materials: Cast stone units shall be manufactured within 100 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- D. Cast-Stone Units: Comply with ASTM C1364.
 - 1. Units shall be manufactured using the vibrant dry tamp or wet-cast method as required for application.
 - 2. Units shall be resistant to freezing and thawing as determined by laboratory testing according to ASTM C666/C666M, Procedure A, as modified by ASTM C1364.
- E. Fabricate units in profiles indicated, with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
 - 1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
 - 2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 - 3. Provide drips on projecting elements unless otherwise indicated.
- F. Cure Units as Follows:
 - 1. Cure units in enclosed, moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
 - 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 or above.
 - b. No fewer than six days at mean daily temperature of 60 deg F or above.
 - c. No fewer than seven days at mean daily temperature of 50 deg F or above.
 - d. No fewer than eight days at mean daily temperature of 45 deg F or above.
- G. Acid etch units after curing to remove cement film from surfaces to be exposed to view.
- H. Colors and Textures: Match existing Garrett College STEM Building cast stone copings and sills "Savannah Blend."

2.2 ACCESSORIES

- A. Anchors: Non-corrosive type, sized for project conditions, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276, or ASTM A666 or steel complying with ASTM A36/A36M and hot-dip galvanized to comply with ASTM A123/A123M.
- B. Dowels: 1/2-inch- diameter round bars, unless indicated otherwise, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276, or ASTM A666 of steel complying with ASTM A36/A36M and hot-dip galvanized to comply with ASTM A123/A123M.
- C. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cast-stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.3 MORTAR

- A. Comply with requirements in Section 042000 "Unit Masonry" for mortar mixes.
 - 1. For setting mortar, use Type N.
 - 2. For pointing mortar, use Type N.
- B. Pigmented Mortar: Where indicated to match existing, use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
- C. Water: potable.
- D. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

2.4 PRODUCTION QUALITY CONTROL

- A. Mix Designs: Test new and existing mix designs for applicable compressive strength and absorption compliance before manufacturing cast stone units.
- B. Plant Production Testing: Test compressive strength and absorption from specimens selected at random from plant production. Tests to be conducted by certified laboratory testing technicians.
 - 1. Custom Cast Stone Units: Test in accordance with ASTM C 1194 and C 1195.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine construction to receive cast stone units. Notify Architect if construction is not acceptable. Do not begin installation until unacceptable conditions have been corrected.
- B. Examine cast stone units before installation. Do not install damaged or unacceptable units.

3.2 SETTING CAST STONE IN MORTAR

- A. Install cast-stone units to comply with requirements in Section 042000 "Unit Masonry" and manufacturer's instructions.
- B. Pull units from multiple cubes during installation to minimize variation in color and maximize natural color blending.
- C. 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.
 - 6. Fill vertical joints with mortar.
 - 7. Remove excess mortar immediately. Remove mortar fins and smears.
- D. Tool exposed joints slightly concave when thumbprint hard unless indicated otherwise. Match existing Garrett College STEM Building joint dimensions and tooling unless indicated otherwise. Use a smooth plastic jointer larger than joint thickness.
- E. Provide sealant joints at head joints of copings and other horizontal surfaces; at expansion, control, and pressure-relieving joints; and at locations indicated.
 - 1. Keep joints free of mortar and other rigid materials.
 - 2. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.3 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

- A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.
 - 1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
 - 2. Shim and adjust anchors, supports, and accessories to set cast stone in locations indicated with uniform joints.

- B. Fill anchor holes with sealant.
 - 1. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.
- C. 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.
- D. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.4 INSTALLATION TOLERANCES

- A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.
- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.5 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 and with touchup materials provided by manufacturer in accordance with manufacturer's instructions.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean cast stone as work progresses.
 - 1. Remove mortar fins and smears before tooling joints.
 - 2. Remove excess sealant immediately, including spills, smears, and spatter.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.

3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Do not use the following to clean units:
 - a. Muriatic acid.
 - b. Power washing.
 - c. Sandblasting.
 - d. Harsh cleaning materials or methods that would damage or discolor surfaces.
 - e. Using materials not allowed by Sustainable Design requirements for this project.

3.6 WATER REPELLANT

- A. Sealer: Manufacturer's standard integral water repellant or another product as recommended by manufacturer for application.
- B. Apply water repellant, other than integral, after installation, cleaning, repair, inspection, and acceptance of units are completed.

3.7 PROTECTION

- A. Protect installed units from splashing, stains, mortar, and other damage during construction duration.

END OF SECTION 047200

SECTION 051010 – STRUCTURAL STEEL INSULATED CONNECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Engineered factory fabricated thermally-broken structural assemblies for connecting exterior structural steel framing to interior structural steel framing.
- B. Related Sections:
 - 1. Section 051200 "Structural Steel Framing" for placing connection anchors, and welding and erection of adjacent steel framing.

1.3 REFERENCE STANDARDS

- A. ASTM: American Society for Testing Materials.
 - 1. ASTM A276: Standard Specification for Stainless Steel Bars and Shapes.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before fabricating assemblies, review special inspection and inspecting agency procedures for quality control, anchorage device installation tolerances, steel reinforcement installation, structural steel framing installation, minimum requirements for concrete mixes and compressive strengths and examine procedures for ensuring quality of materials. Require representatives of each entity directly concerned with the work to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for quality control.
 - c. Structural-steel framing subcontractor.
 - d. Structural thermal break assembly manufacturer, to be available by teleconference.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Submittals:

STRUCTURAL STEEL INSULATED CONNECTIONS

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1. Product Data: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
- C. Shop Drawings: Submit Shop Drawings simultaneously with those specified in Division 1. Include assembly locations, plans, elevations, dimensions, shapes and sections, support conditions, and types of reinforcement, including special reinforcement. Detail fabrication and installation of structural thermal break assemblies.
 1. Indicate welded connections by AWS standard symbols. Show size, length, and type of each weld.
 2. Detail connections.
 3. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 4. Indicate location of each thermal break assembly unit by same identification mark placed on assembly unit.
 5. Indicate relationship of assemblies to adjacent materials.
 6. Indicate locations and details of special supports or cambering.
- D. Sample Assemblies: For each structural steel thermal break assembly. Illustrate materials, workmanship and method of joining subsequently placed materials.
- E. Delegated-Design Submittal: For structural thermal break assemblies 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. Qualification Data: For manufacturer, installer, inspection agency and professional engineer.
- B. Material Certificates: For the following, from manufacturer:
 1. Structural-steel components.
 2. Anchors.
- C. Material Test Reports: For reinforcing steel and structural steel, certified copies of mill test report of materials analysis.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for the following, indicating compliance with performance requirements.
 1. Each type of structural thermal break assembly.
 2. Studs, nuts, and washers including mechanical properties and chemical analysis.
- E. Field quality-control and special inspection reports.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm that assumes responsibility for engineering structural thermal break assemblies to comply with the performance requirements. Responsibility

includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

- B. Installer Qualifications: A qualified installer trained by manufacturer to install structural thermal break assemblies of the types indicated, and with minimum five years documented experience in steel erecting/concrete reinforcing installing similar to the Work indicated.
- C. Inspection Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- D. Design Standards: Comply with the following specifications and documents, as applicable to types of structural thermal break assemblies indicated, unless modified by requirements in the Contract Documents.
 - 1. Steel Construction:
 - a. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges.
 - b. AISC 341 and AISC 341s1 - Seismic Provisions for Structural Steel Buildings Including Supplement No. 1.
 - c. AISC 360 - Specifications for Structural Steel Buildings.
 - d. Specification for Structural Joints Using ASTM A 325 or A 490 Bolts by Research Council on Structural Connections (RCSC).
- E. Mockups: Fabricate full-sized mockups of structural steel thermal break assemblies before production, to verify selections made under sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store assemblies with adequate support and protect units to prevent contact with soil, to prevent staining, and to prevent displacement or physical damage.
 - 1. Place stored units so identification marks are clearly visible, and units can be inspected.
- B. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses that would cause displacement or physical damage. Protect exposed ends of reinforcement to prevent injury; provide continuous wood bar across ends, or suitably sized plastic caps.

1.9 COORDINATION

- A. Coordinate work with installation of connections to supporting structural components.
- B. Furnish 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.

- C. Coordinate selection of shop primers to structural steel assemblies with selection of topcoats or fire protective coatings to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide Isokorb products by:
 - 1. Schöck Bauteile GmbH, Vimbacher Str. 2, 76534 Baden-Baden (Germany); tel. 001 49 7223 967 0; www.schoeck.com; export@schoeck.com.
 - 2. Distributor: Schöck USA Inc., 281 Witherspoon Street, Suite 110, Princeton, NJ 08540, Tel.: 855 572 4625, Email: info@schock-na.com www.schock-na.com
- B. Substitutions: Or Approved Equal.

2.2 PERFORMANCE REQUIREMENTS

- A. Sustainable Requirements:
 - 1. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than **25** percent.
- B. Delegated Design: Design structural thermal break assemblies, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Structural Performance: Exterior steel to interior steel framing or exterior steel to interior cast-in-place concrete floor assembly: Provide structural thermal break assemblies and connections capable of withstanding the following design loads :
 - 1. Provide assembly connections capable of withstanding the design loads indicated: and the following:
 - a. Design Moment: **As indicated on Drawings.**
 - b. Shear Force: **As indicated on Drawings.**
 - c. Axial Load: **As indicated on Drawings.**
 - 2. Design assemblies and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, accommodate live-load deflection, shrinkage and creep of primary building structure and other building movements. Maintain structural concrete deflections within limits of ACI 318 (ACI 318M) and AISC 360.
 - a. Thermal Movements: Allow for in-plane thermal movements resulting from annual ambient temperature changes of minus **30** to plus **120** deg F.

2.3 STRUCTURAL THERMAL BREAK ASSEMBLIES

- A. General: Provide steel-to-steel or steel-to-concrete thermal break assemblies, engineered, tested and sized to suit structure as indicated.
- B. Steel to Steel Connection:
 - 1. Stainless-Steel Plate: ASTM A 666, Type 316Ti, of grade suitable for application as, high strength, pressure and shear bearing devices.
 - 2. Stainless-Steel Rods and Nuts:
 - a. Studs: ASTM F 593, Alloy 316Ti, high strength, rods, threaded, pressure and shear bearing devices.
 - b. Lubricate threaded parts of with an anti-seize thread lubricant during assembly.
 - c. Nuts and Washers: Hex nuts, ASTM F 594 (ASTM F 836M); and flat washers; Alloy [**Group 1 (A1)**] [**Group 2 (A4)**].
- C. Schöck Isokorb S22: Modular assembly for cantilever steel beams resisting normal force and shear force.
 - 1. Material: Stainless steel 316 per ASTM A312.
 - 2. Threaded Rods: 60 ksi tensile strength, ASTM A307 Grade A.
 - 3. Rectangular Hollow Profile: 58 ksi tensile strength, ASTM A500 Grade B.
 - 4. End Plate: 58-80 ksi tensile strength, ASTM A36.
 - 5. Insulation: Polystyrene hard foam.
 - 6. Sliding film: Polytetraflourethylen (PTFE) film.

2.4 FABRICATION

- A. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
 - 1. Weld studs according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
 - 2. Remove, re-weld, or repair incomplete and defective welds.
- B. Reinforce structural thermal break assemblies to resist handling, transportation, and erection stresses.
- C. Protect strand ends and anchorages with manufacturer recommended removable protective coatings or coverings to avoid corrosion.
- D. Discard and replace structural thermal break assembly units that do not comply with requirements, including structural, manufacturing tolerance.
- E. Size assemblies to accommodate required thicknesses of integrated thermal barrier materials.
- F. Fabrication Tolerances: Fabricate structural break assemblies straight and true to size and shape and to applicable requirements of ACI 117.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean connection plates of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond connection efficacy.

3.3 INSTALLATION

- A. Install structural thermal break assemblies level, plumb, and square within specified allowable tolerances. Provide temporary structural supports, and bracing as required to maintain position, stability, and alignment of units until permanent connection or support.
- B. Accurately position, support, and secure reinforcement against displacement, and in accordance with Manual of Standard Practice by CRSI. Locate and support reinforcement with bar supports to maintain minimum concrete cover,
- C. Field cutting of components is not permitted without approval of the Architect.
- D. Field welding of components is not permitted.
- E. At bolted connections, use lock washers, or other approved means to prevent loosening of nuts after final adjustment.
 - 1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connections, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.
- F. Install thermal barrier materials according to manufacturer's written instructions and to comply with requirements for layer thicknesses, jointing methods and anchorage methods applicable to requirements of applicable code.
- G. Installation Tolerances: Maximum Variation from Plumb and Level of Structural Thermal Break Assemblies: 1/8 inch (3 mm).

3.4 FIELD QUALITY CONTROL

- A. Inspections: Owner will engage an inspecting engineer to perform field inspections and prepare reports determining compliance with the structural plans.
1. Provide inspector access to installed assemblies to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.
 2. Inspections:
 - a. Steel members and welds.
 - b. Studs.
 3. Inspector will report findings promptly and in writing to Contractor and Architect.
 4. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
 5. Prepare inspection reports.
- B. Manufacturer's Field Service:
1. Provide a factory-authorized representative to inspect structural thermal break assemblies at the owner or Contractor's commission.
 2. Remove and replace assemblies where inspections indicate that they do not comply with specified requirements.
 3. Additional inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
 4. Prepare inspection reports.

END OF SECTION 051010

SECTION 051200 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 REFERENCES

- A. Details and fabrication of structural steel shall conform to the following publications.

- B. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
 - 1. AISC M013 Detailing for Steel Construction
 - 2. AISC M016 ASD Manual of Steel Construction
 - AISC S335 Structural Steel Buildings Allowable Stress Design and Plastic Design

- C. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)
 - 1. ASTM A36/A36M Carbon Structural Steel
 - 2. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
 - 3. ASTM A123/A123M Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - 4. ASTM A153/A153M Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - 5. ASTM A325 Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
 - 6. ASTM A500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - 7. ASTM A563 Carbon and Alloy Steel Nuts
 - 8. ASTM A780 Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
 - ASTM A992/A992M Steel for Structural Shapes for Use in Building Framing
 - 9. ASTM C827 Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures
 - 10. ASTM C1107 Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
 - 11. ASTM F436 Hardened Steel Washers
 - 12. ASTM F844 Washers, Steel, Plain (Flat), Unhardened for General Use
 - ASTM F959 Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners

13. ASTM F1554 Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

D. AMERICAN WELDING SOCIETY, INC. (AWS)
1. AWS D1.1 Structural Welding Code – Steel

E. STEEL STRUCTURES PAINTING COUNCIL (SSPC)
1. SSPC SP 3 Power Tool Cleaning
2. SSPC SP 6 Commercial Blast Cleaning
3. SSPC Paint 25 Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer
(Without
Lead and Chromate Pigments)
4. SSPC PA 1 Shop, Field, and Maintenance Painting

1.3 SUMMARY

A. Section Includes:
1. Structural steel.
2. Architecturally exposed structural steel.
3. Grout.

B. Related Sections:
1. Division 1 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 5 Section "Steel Deck" for field installation of shear connectors.
3. Division 5 Section "Metal Fabrications" for steel lintels or shelf angles not attached to structural-steel frame, miscellaneous steel fabrications, and other metal items not defined as structural steel.

1.4 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges", that support design loads.

B. Architecturally Exposed Structural Steel: Structural steel designated as architecturally exposed structural steel in the Contract Documents.

1.5 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 ASD-service loads indicated and comply with other information and restrictions indicated.
1. Select and complete connections using schematic details indicated and AISC's "Manual of Steel Construction, Allowable Stress Design," Part 4.

2. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer to prepare structural analysis data for structural-steel connections.
- B. Construction: Combined system of moment frame, braced frame, and shear walls.
- C. Moment Connections: Type FR, fully restrained.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 2. Include embedment drawings.
 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts.
 5. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Erection Plan.
 1. Submit for record purposes. Indicate the sequence of erection, temporary shoring and bracing, and a detailed sequence of welding, including each welding procedure required.
- D. Welding certificates.
- E. Qualification Data: For testing agency.
- F. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
 1. Structural steel including chemical and physical properties.
 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 3. Shear stud connectors.
 4. Load indicator washers.
 5. Shop primers.
 6. Nonshrink grout.
- G. Source quality-control test reports.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.
 - 1. Fabricator must participate in the AISC Quality Certification Program and be designated an AISC-Certified Plant as follows:
 - a. Category: Category I, conventional steel structures.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
 - 3. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
 - 4. AISC's "Specification for the Design of Steel Hollow Structural Sections."
 - 5. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
 - 6. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 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.

1.9 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M, Grade 50.
- B. Channels, Angles: ASTM A 36.
- C. Plate and Bar: ASTM A 36.
- 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.
 - 1. Weight Class: Standard.
 - 2. Finish: Black.
- F. Welding Electrodes and Rods: Comply with AWS D1.1 requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
 - 1. Finish: Plain.
- B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- C. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
 - 1. Configuration: as indicated.
 - 2. Nuts: ASTM A 563 hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436 hardened carbon steel.
 - 5. Finish: Plain.
- D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
 - 1. Nuts: ASTM A 563 hex carbon steel.

2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 hardened carbon steel.
4. Finish: Plain.

E. Load Indicator Washers: ASTM F959.

2.3 SHOP PRIMER

- A. SSPC Paint 25 epoxy-polyamide, green primer (Form 150) type 1. Primer shall conform to Federal, State, and local VOC regulations. If flash rusting occurs, re-clean the surface prior to application of primer.

2.4 GALVANIZING

- A. ASTM A123 or ASTM A153, as applicable, unless specified otherwise, galvanize after fabrication where practicable.

2.5 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time; capable of developing a minimum compressive strength of 8,000 psi in 28 days.

2.6 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's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
1. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
 2. Mark and match-mark materials for field assembly.
 3. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Architecturally Exposed Structural Steel: Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel identified as architecturally exposed structural steel.
1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, seam marks, roller marks, rolled trade names, and roughness.
 2. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.

- C. 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.
- D. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- F. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6 (U.N.O.)
- G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
- H. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 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 (U.N.O.).
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 - 1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 - 3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

2.8 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Shop prime structural steel, except as modified herein, in accordance with SSPC PA
 - 2. Do not prime steel surfaces embedded in concrete, galvanized surfaces, surfaces to receive sprayed-on fireproofing, surfaces to receive epoxy coatings, surfaces designed as part of a composite steel concrete section, or surfaces within 0.5 inch of the toe of the welds prior to welding, except surfaces on which metal decking is to be welded. Prior to assembly, prime surfaces which will be concealed or inaccessible after assembly. Do not apply primer in foggy or rainy weather; when the ambient temperature is below 45 degrees F or over 95 degrees F; or when the primer may be exposed to temperatures below 40 degrees F within 48 hours after application, unless approved otherwise by the Engineer.
- B. Surface Preparation: Clean surfaces to be painted. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC SP 6, except steel exposed in spaces above ceilings, attic spaces, furred spaces, and chases that will be hidden to view in finished construction may be cleaned to SSPC SP 3 when recommended by the shop primer manufacturer. Maintain steel surfaces free from rust, mill scale, spatter, slag, flux, dirt, oil, grease, and other contaminants through final assembly.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 2 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces. Repair damaged primed surfaces with an additional coat of primer.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize lintels, shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.
 - 3. All structural steel, bolts, connectors and fasteners exposed to moisture shall be galvanized.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base, Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that

will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Do not use thermal cutting during erection.
- H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened (U.N.O.).
- A. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to inspect the erected steel in the field. This inspection shall also include alignment, position of member, welds and high-strength bolted connections, painting, etc. The

inspection agency shall also submit to the Structural Engineer certified reports showing results of these inspections.

- B. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
 - 1. Should deficiencies in welds be noted by visual inspection then field welds may be tested according to AWS D1.1 and the following inspection procedures, at Owner'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.
 - 2. In addition to the visual inspection as indicated above, ultrasonic testing of all groove welds which are in tension and 25% of all groove welds which are in compression shall be required. The testing shall be done using "Branson" ultrasonic testing equipment, or other approved non-destructive testing systems. If faulty welds are discovered by this testing, costs of repair and any additional tests shall be borne by the Contractor.
- D. Should visual inspection identify deficiencies in welded shear connectors, then field-welded shear connectors may be tested according to requirements in AWS D1.1 for stud welding at Owner's option as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- F. Submit certified field reports, indicating that the steel, including corrected deficiencies as erected meets all of the requirements of the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel 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 3.

- C. Touchup Painting: Cleaning and touchup painting are specified in Section 09911 "Exterior Painting" and Section 09912 "Interior Painting."

END OF SECTION 051200

SECTION 052100 - STEEL JOISTS

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. Section Includes:
 - 1. K-series steel joists.
 - 2. KCS-type K-series steel joists.
 - 3. K-series steel joist substitutes.
 - 4. LH- and DLH-series long-span steel joists.
 - 5. Joist girders.
 - 6. Joist accessories.
- B. Related Requirements:
 - 1. Division 1 Section "Quality Control" for independent testing agency procedures and administrative requirements.
 - 2. Division 4 Section "Unit Masonry" for installing bearing plates and anchors set in unit masonry.
 - 3. Division 5 Section "Structural Steel" for field quality-control procedures and tests.
 - 4. Division 5 Section "Metal Fabrications" for loose, steel bearing plates and miscellaneous steel framing.

1.3 DEFINITIONS

- A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

- B. Product Data for each type of joist, accessory, and product specified.
- C. Shop Drawings showing layout, mark, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, accessories, splice and connection details, and attachments to other units of Work.
 - 1. Indicate locations and details of anchorage devices and bearing plates to be embedded in other construction.
 - 2. For joists indicated to comply with certain design loadings, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Material certificates signed by joist manufacturer certifying that joists comply with SJI's "Specifications."
- E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.
- F. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage a firm experienced in manufacturing joists similar to those indicated for this Project and that have a record of successful in-service performance.
 - 1. Manufacturer must be certified by SJI to manufacture joists conforming to SJI standard specifications and load tables.
- B. SJI Design Standard: Comply with recommendations of SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders," applicable to types of joists indicated.
- C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."
 - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the 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 joists that are similar to those indicated for this Project in material, design, and extent.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.7 SEQUENCING

- A. Deliver steel bearing plates to be built into concrete and masonry construction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Engineer, fabricate, and erect joists and connections to withstand design loads within limits and under conditions required.
 - 1. Design Loads: As indicated.
 - 2. Design joists and joist girders to withstand design loads without deflections greater than the following:
 - a. Roof Joists: Maximum vertical deflection of L/360 of the clear span under uniform live load, for all areas having suspended ceilings. Maximum vertical deflection of L/240 of the clear span under total uniform load.
 - 3. Wind Uplift: All roof joists shall be designed to resist a net wind uplift force as indicated. Locate bridging near the first bottom chord panel point and design all joist members to satisfy this additional loading condition.
 - 4. All strut joists on column centerlines shall be designed to resist an additional wind/seismic fixed end moment of 15 kip-feet in addition to the fixed end moments resulting from the live load (U.N.O.).
- B. Engineering Responsibility: Engage a joist manufacturer who utilizes a qualified professional engineer to prepare design calculations, shop drawings, and other structural data for steel joists.

2.2 MATERIALS

- A. Steel: Comply with requirements of SJI's "Specifications" for chord and web section material.
- B. Steel Bearing Plates: ASTM A 36.
- C. High-Strength Bolts and Nuts: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Plain, noncoated.
- D. Welding Electrodes: Comply with AWS standards.

2.3 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.
- B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.
- C. Provide holes in chord members for connecting and securing other construction to joists.
- D. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."
- E. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- F. Camber joists according to SJI's "Specifications."
- G. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

2.4 LONG-SPAN STEEL JOISTS

- A. Manufacture steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as follows:
 - 1. Joist Type: LH-series steel joists and DLH-series steel joists.
 - 2. End Arrangement: Underslung with bottom chord extensions as indicated on plans.
 - 3. Top-Chord Arrangement: Parallel.
- B. Provide holes in chord members for connecting and securing other construction to joists.
- C. Camber long-span steel joists according to SJI's "Specifications."
- D. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

2.5 JOIST GIRDERS

- A. Manufacture joist girders according to "Standard Specifications for Joist Girders" in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements as follows:
 - 1. End Arrangement: Underslung with bottom chord extensions as indicated on plans.
 - 2. Top-Chord Arrangement: Parallel.

- B. Provide holes in chord members for connecting and securing other construction to joist girders.
- C. Camber steel joists girders according to SJI's "Specifications."
- D. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

2.6 PRIMERS

- A. Primer: SSPC-Paint 15, Type I, red oxide; Federal Specification TT-P-636, red oxide; or manufacturer's standard shop primer meeting the performance requirements of either of these red-oxide primers.

2.7 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span.
 - 1. Supply additional bridging to ensure stability of structure during construction period.
- B. Fabricate steel bearing plates with integral anchorages as indicated and finish as follows:
 - 1. Finish: Shop prime paint.
- C. Steel bearing plates with integral anchorages are specified in Division 5 Section "Metal Fabrications."
- D. Supply miscellaneous accessories, including splice plates and bolts required by the joist manufacturer to complete the joist installation.

2.8 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories to be primed as follows:
 - 1. Surface Preparation: Either hand tool cleaning, SSPC-SP 2, or power tool cleaning, SSPC-SP 3.
- B. Apply one shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film thickness of not less than 1 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of joists. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 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 recommendations, and the requirements of 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 bridging, connections, and anchors to ensure joists are stabilized during construction.
- C. Field weld joists to supporting steel framework and steel bearing plates. Coordinate welding sequence and procedure with placing of joists.
 - 1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to inspect the erected steel in the field. This inspection shall also include alignment, position of member, welds and high-strength bolted connections, painting, etc. The inspection agency shall also submit to the Structural Engineer certified reports showing results of these inspections.
- B. Testing agency will report test results promptly and in writing to Contractor and Architect.
- C. Testing and verification procedures will be required of high-strength bolted connections and field welds.
 - 1. Field welds will be visually inspected.
 - 2. In addition to visual inspection, field welds may be inspected and tested according to AWS D1.1 and the following procedures:
 - a. Radiographic Testing: ASTM E 94 and ASTM E 142.

- b. Magnetic Particle Inspection: ASTM E 709.
 - c. Ultrasonic Testing: ASTM E 164.
 - d. Liquid Penetrant Inspection: ASTM E 165.
- D. Correct deficiencies in Work that inspections and test reports have indicated are not in compliance with specified requirements.
 - E. Additional testing will be performed to determine compliance of corrected Work with specified requirements.
 - F. Submit certified field reports, indicating that the steel, including corrected deficiencies as erected meets all of the requirements of the Contract Documents.

3.4 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and the manufacturer's instructions.
- B. Touch Up Painting: Following installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, accessories, bearing plates, and abutting structural steel.
 - 1. Clean and prepare surfaces by hand tool cleaning, SSPC-SP 2, or power tool cleaning, SSPC-SP 3.
 - 2. Apply a compatible primer of the same type as the shop primer used on adjacent surfaces.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 052100

SECTION 053100 - STEEL DECK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Roof deck.
 - 2. Composite floor deck.
- B. Related Sections include the following:
 - 1. Division 3 Section "Cast-in-Place Concrete" for concrete fill.
 - 2. Division 5 Section "Structural Steel" for shop- and field-welded shear connectors.
 - 3. Division 5 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
 - 4. Division 9 painting Sections for repair painting of primed deck.

1.3 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. LEED Submittal:
 - 1. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - a. Include statement indicating costs for each product having recycled content.
- C. 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.
- D. Product Certificates: For each type of steel deck, signed by product manufacturer.
- E. Welding certificates.
- F. Field quality-control test and inspection reports.

- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - 1. Power-actuated mechanical fasteners.
 - 2. Acoustical roof deck.
- H. Research/Evaluation Reports: For steel deck.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
- B. Source Limitations for Electrified Cellular Floor Deck: Obtain cellular floor-deck units and compatible electrical components, such as preset inserts, activation kits, afterset inserts, service fittings, header ducts, and trench header ducts, from same manufacturer.
- C. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- D. 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.
- E. 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."
- F. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL's "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.
- G. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.
- H. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
 - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

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:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Steel Deck:
 - a. ASC Profiles, Inc.
 - b. Canam Steel Corp.;The Canam Manac Group.
 - c. Consolidated Systems, Inc.
 - d. DACS, Inc.
 - e. D-Mac Industries Inc.
 - f. Epic Metals Corporation.
 - g. Marlyn Steel Decks, Inc.
 - h. New Millennium Building Systems, LLC.
 - i. Nucor Corp.; Vulcraft Division.
 - j. Roof Deck, Inc.
 - k. United Steel Deck, Inc.
 - l. Valley Joist; Division of EBSCO Industries, Inc.
 - m. Vercor Manufacturing Co.
 - n. 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, Structural Steel (SS), Grade 33 G60 (Z180) zinc coating.
 - 2. Deck Profile: As indicated

3. Profile Depth: As indicated
4. Span Condition: As indicated
5. Side Laps: Overlapped

2.3 COMPOSITE FLOOR DECK

- A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 50, G60 (Z180) zinc coating.
 2. Profile Depth: As indicated.
 3. Design Uncoated-Steel Thickness: As indicated.
 4. Span Condition: As indicated.

2.4 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. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 30 for overhang and slab depth.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch (1.52 mm) thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.

- J. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- K. 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.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
 - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. All holes and openings required shall be coordinated with the drawings, specifications, and other trades. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work as follows (U.N.O.):
 - 1. Holes and openings shall be drilled or cut, reinforced and framed as indicated on the drawings or described in the specifications and as required for rigidity and load capacity. Holes and openings less than 6 inches across require no reinforcement. Holes and openings 6 to 12 inches across shall be reinforced by 0.0598 inch thick steel sheet painted or galvanized to match deck opening at least 12 inches wider and longer than the opening and be fastened to the steel deck at each corner of the sheet and at a maximum of 6 inches on center. Holes and

openings larger than 12 inches shall be reinforced by steel angles installed perpendicular to the steel joists and supported by the adjacent steel joists. Steel angles shall be installed perpendicular to the deck ribs and shall be fastened to the angles perpendicular to the steel joists. Openings must not interfere with seismic members such as chords and drag struts.

- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- J. Shear Connections: Weld shear connectors to supports through decking units in accordance with manufacturer's instructions. Do not weld shear connectors through two layers (lapped ends) of decking units. Weld only on clean, dry deck surfaces.

3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:
 - 1. Weld Diameter: 5/8 inch (16 mm), nominal (U.N.O.).
 - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support (U.N.O.). Space welds 12 inches apart in the field of roof and 6 inches apart in roof corners and perimeter (U.N.O.), based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28.
 - 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 24 inches (U.N.O.), and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
 - 2. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
 - 1. End Joints: Lapped 2 inches (51 mm) minimum or butted at Contractor's option.
- D. 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.

- E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 - 1. Weld Diameter: 3/4 inch nominal.
 - 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart.
 - 3. Weld Spacing: Space and locate welds as indicated.
 - 4. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches, and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
 - 2. Mechanically clinch or button punch.
 - 3. Fasten with a minimum of 1-1/2-inch long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- E. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- F. Install piercing hanger tabs at 14 inches apart in both directions, within 9 inches of walls at ends, and not more than 12 inches from walls at sides unless otherwise indicated.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds and fasteners 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.
- F. Submit certified field reports, indicating that the steel deck, including corrected deficiencies as erected meets all of the requirements of the Contract Documents.

3.6 REPAIRS AND PROTECTION

- 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.
 - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
 - 2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Division 9 .
- C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Division 9.
- D. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Load-bearing wall framing.
 - 2. Exterior non-load-bearing wall framing.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for masonry shelf angles and connections.
 - 2. Section 092910 "Gypsum Board Assemblies" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. Delegated-Design Submittal: For cold-formed steel framing.
- C. Shop Drawings: Submit placement drawings for framing members showing size and gage designations, number, type, locations, and spacing. Indicate reinforced channels, opening framing, supplemental strapping, bracing, bridging, splices, connection details, accessories and details required for proper installation. Shop Drawings shall be signed and sealed by registered Professional Engineer, licensed in the state in which project is located and employed by the lightgauge metal framing contractor.
 - 1. Include fully dimensioned and detailed drawings of special components not covered by Product Data.
 - 2. Submittal to include complete design calculations signed and sealed by registered Professional Engineer, licensed in the state in which project is located and employed by the lightgauge metal framing contractor.
- D. Stud sizes and details shown on Drawings indicate general installation and connection methods. Complete design and detailing of all components for all loads and forces is to be shown on the Shop Drawings. Design of all conditions not detailed on the Drawings shall be provided by a

registered Professional Engineer, licensed in the State in which project is located and employed by the lightgauge metal framing contractor. No changes from sizes and installation methods shown will be permitted without the express written consent of the Architect and the Structural Engineer.

- E. Welding certificates.
- F. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- G. Research/Evaluation Reports: For cold-formed metal framing.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- D. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
1. Design Loads: As indicated.
 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Load / Non-Load Bearing Wall Framing: Steel framing / studs shall be of a configuration and gage to provide sufficient stiffness, as controlled by the maximum allowable horizontal deflection, under full live load, dead load and wind load of 1/600 of the wall height when secured to masonry veneer and 1/360 in all other areas.
 - b. Interior Load / Non-Load Bearing Wall Framing: Steel framing / studs shall be of a configuration and gage to provide sufficient stiffness, as controlled by the maximum allowable horizontal deflection of L/360 of the wall height under a horizontal load of 5 lbf/sq. ft. in all areas (U.N.O.).
 - c. Shear Wall Framing: Steel framing / studs / strapping / connections shall be of a configuration and gage to provide sufficient stiffness and strength to support loads as indicated. Maximum allowable story drift shall not exceed H/500.
 - d. Soffit / Ceiling Framing: Vertical deflection of 1/360 of the horizontally projected span for live load and 1/240 for total loads in all areas.
 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 1 inch.
 5. Steel framing / studs secured to masonry veneer shall be minimum 18 gauge with maximum spacing not to exceed 16 inches on center.
 6. Design exterior load / non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Design Standards:
1. Floor and Roof Systems: AISI S210.
 2. Wall Studs: AISI S211.
 3. Headers: AISI S212.
 4. Lateral Design: AISI S213.
- D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
- E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 COLD-FORMED STEEL FRAMING, GENERAL

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60.
- B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60.

2.3 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329 inch.
 - 2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
 - 2. Flange Width: 1-1/4 inches.
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329 inch.
 - 2. Flange Width: 1-5/8 inches.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329 inch.
 - 2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness Matching steel studs.
 - 2. Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with

flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1 inch plus the design gap for one-story structures.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
 - a. Minimum Base-Metal Thickness: 0.0329 inch.
 - b. Flange Width: 1 inch plus the design gap for one-story structures.
2. Inner Track: Of web depth indicated, and as follows:
 - a. Minimum Base-Metal Thickness: 0.0428 inch.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with 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 per ASTM E 488 conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.8 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

- b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: As shown on Shop Drawings.
- B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
 1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
 2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. Install horizontal bridging in stud system, spaced vertically as indicated on Shop Drawings. Fasten at each stud intersection.
 1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
 2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

- J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
- K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to bypassing studs and anchor to building structure.
 - 4. Connect drift clips to cold-formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - a. Install solid blocking at centers indicated on Shop Drawings.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- F. Submit certified field reports, indicating that the metal framing, including corrected deficiencies as erected meets all of the requirements of the Contract Documents.

3.7 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The General Conditions and Division 1, General Requirements, are hereby made a part of this Section as fully as if written entirely herein.

1.2 SUMMARY

- A. Section includes shop fabricated metal items.
 - 1. Steel stair frame of structural sections, with closed risers; pan to receive concrete fill stair treads and landings; integral balusters and handrailing.
 - 2. Steel pipe tube railings, balusters, and fittings; and handrails.
 - 3. Steel channel opening frames
 - 4. Lintels, ledge and shelf angles and loose steel shapes.
 - 5. Steel ladders
 - 6. Steel pipe bollards.
 - 7. Setting compounds for railings.
 - 8. Steel component materials.
 - 9. Finishes.
- B. Related Sections:
 - 1. Section 033000 - Cast-In-Place Concrete
 - 2. Section 051200 - Structural Steel
 - 3. Section 053100 – Steel Deck
 - 4. Section 099000 - Painting

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Components
 - 1. Basis of Measurement: By the unit.
 - 2. Basis of Payment: Includes fabrication, finishing, and installation.

1.4 REFERENCES

- A. AA DAF-45 (Aluminum Association) - Designation System for Aluminum Finishes.
- B. AAMA 603.8 9 (American Architectural Manufacturers Association) - Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum.
- C. AAMA 605.2 (American Architectural Manufacturers Association) - Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.

- D. AAMA 606.1 (American Architectural Manufacturers Association) - Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum.
- E. AAMA 607.1 (American Architectural Manufacturers Association) - Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
- F. AAMA 608.1 (American Architectural Manufacturers Association) - Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
- G. ANSI A14.3 - Ladders, Fixed, Safety Requirements.
- H. ASTM A36/A36M - Carbon Structural Steel.
- I. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe.
- J. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- K. ASTM A153/A153M - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- L. ASTM A283/A283M - Low and Intermediate Tensile Strength Carbon Steel Plates.
- M. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- N. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- O. ASTM A325M - Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric).
- P. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.
- Q. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- R. ASTM A653/A653M - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip process.
- S. ASTM B26/B26M - Aluminum-Alloy Sand Castings.
- T. ASTM B85 - Aluminum-Alloy Die Castings.
- U. ASTM B177 - Chromium Electroplating on Steel for Engineering Use.
- V. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

- W. ASTM B209M - Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
- X. ASTM B210 - Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
- Y. ASTM B210M - Aluminum and Aluminum-Alloy Drawn Seamless Tubes (Metric).
- Z. ASTM B211 - Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
- AA. ASTM B211M - Aluminum and Aluminum-Alloy Bar, Rod, and Wire (Metric).
- BB. ASTM B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube.
- CC. ASTM B483M – Aluminum and Aluminum – Alloy Drawn Tubes for general Purpose Application (Metric).
- DD. ASTM E935 - Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
- EE. ASTM E985 - Permanent Metal Railing Systems and Rails for Buildings.
- FF. AWS A2.0 (American Welding Society) – Standard Welding Symbols.
- GG. ASTM B221M - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube (Metric).
- HH. AWS A2.4 (American Welding Society) - Symbols for Welding, Brazing, and Nondestructive Examination.
- II. AWS D1.1 (American Welding Society) - Structural Welding Code.
- JJ. NAAMM (National Association Architectural Metal Manufacturers) - Metal Stairs Manual.
- KK. NAAMM (National Association Architectural Metal Manufacturers) - Metal Bar Grating Manual.
- LL. SSPC (Steel Structures Painting Council) - Painting Manual.

1.5 STAIR, RAILING DESIGN REQUIREMENT

- A. Fabricate stair assembly to support uniform live load of 100 lb/sq ft and concentrated load of 300 lb/sq ft with deflection of stringer or landing framing not to exceed 1/360 of span. Test in accordance with ASTM A935.
- B. Railing assembly, wall rails, and attachments to resist lateral force of 200 lbs or 50 lbs per foot at any point in any direction without damage or permanent set. Test in accordance with ASTM A935.

- C. Fabricate stair assembly to NAAMM - Metal Stairs Manual, Class Service. Commercial.

1.6 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal requirements.
- B. LEED Submittals
 1. Product data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of pre-consumer and post-consumer recycled content. Include statement indicating cost of each product with recycled content.
 2. Product data for Credit MR 5: For products having regional material content, documentation indicating location of manufacture and location of extraction, recovery or harvest of primary raw materials. Include statement indicating cost of each product with regional material content.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths. Shop drawings for stair and railing assemblies must be signed and sealed. Shop Drawings: Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.
- D. Submit design calculations for stairs and railing assemblies. Calculations shall be signed and sealed by a professional engineer licensed in the State of Maryland.
- E. Samples: Submit two samples illustrations factory finishes.
- F. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM E985 - Permanent Metal Railing Systems and Rails for Buildings.
- B. Maintain one copy of each document on site.
- C. Prepare Shop Drawings under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Maryland.
- D. Welders' Certificates: Submit under provisions of Section 01300, certifying welders employed on the Work, verifying AWS qualification within previous 12 months.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Product Requirements: Product storage and handling requirements.
- B. Accept metal fabrications on site in labeled shipments. Inspect for damage.
- C. Protect metal fabrications from damage by exposure to weather.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on shop drawings.

PART 2 – PRODUCTS

2.1 MATERIALS – STEEL

- A. Recycled Content: Provide steel with minimum 30 percent total recycled content, including at least 25 percent post-consumer recycled content.
- B. Steel Sections: ASTM A36.
- C. Steel Tubing: ASTM A500, Grade 46 ASTM A501.
- D. Plates: ASTM A283
- E. Pipe: ASTM A53, Grade B Schedule 40.
- F. Fasteners.
- G. Bolts, Nuts, and Washers: ASTM A325 galvanized to ASTM A153 for galvanized components.
- H. Welding Materials: AWS D1.1; type required for materials being welded.
- I. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.
- J. Touch-up primer for galvanized surfaces; SSPC paint 20 Zinc rich.

2.02 COMPONENTS

- A. Miscellaneous Metal Fabrications:
 - 1. Following is list of principal items only. Refer to Drawings for items not specifically scheduled.

2. Roof Ladder: ANSI A14.3, Steel, of 3/8 x 2 inches side rails spaced at 20 inches; rungs of one inch diameter solid rod spaced 12 inches on center; space rungs 7 inches from wall surface; with steel mounting brackets and attachments; prime paint finish.
 3. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
 4. Joist Hangers: Joist strap anchors, fabricated with steel; prime paint finish.
 5. Ledge and Shelf Angles, Not Attached to Structural Framing: Prime paint.
 6. Lintels: As detailed; prime paint finish. Galvanized where exposed to weather.
 7. Door Frames for Overhead Door Openings and Wall Openings: Channel sections; prime paint finish.
 8. Hoistway Divider Beams: Beam sections; prime paint finish.
 9. Toilet Partition Suspension Members: Steel angle sections; prime paint finish.
- B. Metal Stairs and Landings: Refer to Drawings for location and configuration.
1. Steel Sections: ASTM A36/A36M.
 2. Steel Tubing: ASTM A500, Grade 46. ASTM A501.
 3. Plates: ASTM A283/A283M.
 4. Pipe: ASTM A53, Grade B Schedule 40.
 5. Tread and Landing Concrete Reinforcement: Mesh type
 6. Bolts, Nuts, and Washers: ASTM A325 galvanized to ASTM A153 for galvanized components.
 7. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; consistent with design of stair structure.
 8. Welding Materials: AWS D1.1; type required for materials being welded.
 9. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.
 10. Stair Treads: Shop cast concrete in metal pan; smooth surface; non-slip edge.
 11. Concrete: Type specified in Section 03300.
 12. Concrete for Treads and Landings: Portland cement Type I, 3000 psi, 28 day strength, 2 to 3 inch slump.
- B. Steel Railing Systems: Refer to Drawings for location and configuration.
1. Steel Tubing: ASTM A500, Grade B. ASTM A501.
 2. Pipe: ASTM A53, Grade B Schedule 40.
 3. Fittings: Elbows, T-shapes, wall brackets, escutcheons; machined steel.
 4. Mounting: Adjustable brackets and flanges, with steel inserts for casting in concrete with steel brackets for embedding in masonry.
 5. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
 6. Splice Connectors: Steel concealed spigots.
 7. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2.3 FABRICATION

- A. Miscellaneous Metal Fabrications:
1. Fit and shop assemble items in largest practical sections, for delivery to site.
 2. Fabricate items with joints tightly fitted and secured.
 3. Continuously seal joined members by continuous welds.

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4. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
 5. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
 6. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
 7. Accurately form components required for anchorage of stairs and landings and railings to each other and to building structure.
- B. Pan Stairs and Landings:
1. Fabricate stairs and landings with closed risers and treads of metal pan construction, ready to receive concrete.
 2. Form treads and risers with minimum 10 gage sheet steel stock.
 3. Secure reinforced tread pans to stringers with clip angles welded or bolted in place.
 4. Form stringers with rolled steel channels or rectangular hollow section 12 inches deep.
 5. Form landings with minimum 10 gage sheet stock. Reinforce underside with angles to attain design load requirements.
 6. Form balusters with 3/4 inch square steel sections, welded to stringers.
- C. Steel Railing Systems:
1. Fit and shop assemble components in largest practical sizes for delivery to site.
 2. Fabricate components with joints tightly fitted and secured. Furnish spigots and sleeves to accommodate site assembly and installation.
 3. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
 4. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
 5. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations not encouraging water intrusion.
 6. Interior Components: Continuously seal joined pieces by continuous welds.
 7. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
 8. Accurately form components to suit stairs and landings, to each other and to building structure.
 9. Accommodate for expansion and contraction of members and building movement without damage to connections or members.

2.4 FACTORY APPLIED FINISHES – STEEL

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime paint items with one coat except where galvanizing is specified.
- D. Galvanized Structural Steel Members: Galvanize after fabrication to ASTM A123. Furnish minimum 1.25 oz/sq ft galvanized coating. (Note all steel above roof and or exposed to moisture and lintels to be galvanized).
- E. Galvanized Non-structural Items: Galvanized after fabrication to ASTM A123. Furnish minimum 1.25 oz/sq ft galvanized coating.

2.5 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in.
- E. Maximum Deviation From Plane: 1/16 inch

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify field conditions are acceptable and are ready to receive Work.
- C. Verify concealed blocking and reinforcement is installed and correctly located to receive wall mounted handrails.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
- C. Perform field welding in accordance with AWS D1.1.
- D. Obtain approval of Architect/Engineer prior to site cutting or making adjustments not scheduled.
- E. After erection, prime welds, abrasions, and surfaces not shop primed galvanized, except surfaces to be in contact with concrete.
- F. Install anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- G. Allow for erection loads. Install sufficient temporary bracing to maintain framing safe, plumb, and in alignment.
- H. Field weld components indicated on Drawings and shop drawings. Perform field welding in accordance with AWS D1.1.
- I. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible.
- J. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.
- K. Obtain approval of Architect/Engineer prior to site cutting or creating adjustments not scheduled.
- L. Anchor railings to structure with anchors, plates.
- M. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- N. Assemble with spigots and sleeves to accommodate tight joints and secure installation.

3.4 ERECTION TOLERANCES

- A. Section 014000 - Quality Requirements: Tolerances.
- B. Maximum Variation from Plumb: 1/4 inch per story or for every 12 ft in height whichever is greater, non-cumulative.

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- C. Maximum Offset From Alignment: ¼ inch.
- D. Maximum Out-of-Position: 1/4 inch.

3.5 SCHEDULES

- A. Stairs 1 and 2: Pan stairs and landings, steel pipe handrail, primed finish.

END OF SECTION 055000

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe and tube railings.
- B. Related Requirements:
 - 1. Section 057300 "Decorative Metal Railings" for decorative railings in lobby and audience chamber where indicated.
 - 2. Section 055000 "Metal Fabrications" for railings as part of metal stair system.
 - 3. Refer to Drawings for additional railing types, locations, and details.
 - 4. Division 09 Painting Sections.
 - 5. Section 055923 Auditorium Catwalks for railings as part of catwalk system.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of mechanically connected railings.
 - 2. Railing brackets.
 - 3. Grout, anchoring cement, and paint products.

- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each type of exposed finish required.
 - 1. Full size, 36-inch long sections of each distinctly different linear railing assembly, including handrails, top rails, posts, and balusters, finished in required paint and color required.
 - 2. Sample shall include a fabricated joint to show welded connections with welds ground smooth and flush.
 - 3. Fittings and brackets.
- D. Structural Calculations: Submit structural analysis data and calculations for pipe and tube railings signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Engineer Qualifications: Engineering of railing assemblies shall be design by a professional engineer legally authorized to practice in the jurisdiction where Project is located and experienced in providing engineering services of the kind indicated for railing systems similar to this Project in material, design, and extent, and that have a record of successful in-service performance.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- D. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.
- E. Evaluation Reports: For post-installed anchors , from ICC-ES.

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 D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

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

1.8 FIELD CONDITIONS

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

PART 2 - PRODUCTS

- A. Source Limitations: Obtain each type of railing 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 railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - d. Limit deflection of rails to $L/120$ or 3/4 inch, whichever is less.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F.

2.3 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.4 STEEL AND IRON

- A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

D. Woven-Wire Mesh: Intermediate-crimp, square pattern, 2-inch woven-wire mesh, made from 0.134-inch- diameter wire complying with ASTM A 510.

2.5 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Extruded Bars and Tubing: ASTM B 221, Alloy 6063-T5/T52.

C. Extruded Structural Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.

1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.

D. Drawn Seamless Tubing: ASTM B 210, Alloy 6063-T832.

E. Plate and Sheet: ASTM B 209, Alloy 6061-T6.

F. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.

G. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

2.6 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.

2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.

3. Aluminum Railings: Type 316 stainless-steel fasteners.

4. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.

2. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

3. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.7 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Shop Primers: Provide primers that comply with Division 09 Painting Sections.
- C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- D. Intermediate Coats and Topcoats: Provide products that comply with Division 09 Painting Sections.
- E. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.
- F. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- H. 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.
- I. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.8 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- J. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- K. Form simple and compound curves by bending members in 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.
- L. Close exposed ends of railing members with prefabricated end fittings.
- M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

- P. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into 1-by-1/2-by-1/8-inch metal channel frames. Make wire mesh and frames from same metal as railings in which they are installed.
 - 1. Orient wire mesh with as indicated on Drawings.
- Q. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.9 STEEL AND IRON FINISHES

- A. Galvanized Railings:
 - 1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
 - 2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
 - 3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
 - 4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 - 5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- D. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.
- E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below:
 - 1. Exterior Railings: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Railings Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Other Railings: SSPC-SP 3, "Power Tool Cleaning."
- F. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

2.10 ALUMINUM FINISHES

- A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are unacceptable. Variations in appearance of other components are

acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

- B. Mill Finish: AA-M12, nonspecular as fabricated.
- C. Clear Anodic Finish: AAMA 611, AA-M12C22A41.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

- A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- C. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.
- D. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.
 - 2. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.5 ATTACHING RAILINGS

- A. Attach railings to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- B. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
 - 4. For steel-framed partitions, fasten brackets directly to steel framing or concealed steel reinforcements using self-tapping screws of size and type required to support structural loads or with toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.6 ADJUSTING AND CLEANING

- A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- C. Field Painting: Field finishing of railings is specified in Division 09, Painting.
- D. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

3.7 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

SECTION 055813 – METAL COLUMN COVERS AND ENTRYWAY PEDESTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal column covers and related items for a complete installation of column covers where indicated in Drawings.
 - 2. Entryway pedestal bollards for mounting card reader and door actuator where indicated on Drawings.
- B. Related Requirements:
 - 1. Structural and plumbing specifications and drawings for coordination with structural steel and drainage piping to housed in metal column covers.
 - 2. Access control and electrical specification sections and drawings for coordination with controls to be mounted on entryway pedestal bollards.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including finishing materials.
- B. Shop Drawings: Show fabrication and installation details for column covers. Indicate quantities, finishes, dimensions, joint locations and dimensions, and attachment relationships.
- C. Samples: For each type of exposed finish required, prepared on 6-inch- square samples of metal of same color, finish, thickness and material indicated for the Work.

1.4 QUALITY ASSURANCE

- A. Manufacturer shall have a minimum of 5 years' experience in manufacturing architectural metals.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver components in clearly marked containers and packages suitable for shipment of

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specified products so as to prevent finish damage in transit. Provide protective wrapping or film to provide protection.

- B. Store components in locations that will avoid damage from job-site traffic, moisture, stacking or other job-site contamination.
- C. Handle components to avoid racking, twisting, denting or scratching of finished surfaces.

1.6 WARRANTY

- A. Provide manufacturer's warranty against defects in material and workmanship for a period of one year beginning on Date of Substantial Completion.
- B. Finish warranty: Warrant fluoropolymer coating to remain free, under normal atmospheric conditions, from peeling, checking, cracking, chalking in excess of numerical rating of 8 when measured in accord with ASTM D4214, of fading in excess of 5 N.B.S. Units during warranty period. Warranty period shall be 5 years, beginning at Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 METAL COLUMN COVERS

- A. Basis of Design: Subject to compliance with project requirements, Basis of Design is Series SD – Small Diameter aluminum column cover with Soft “v” Butt Joint, manufactured by Fry Reglet Corporation, 1377 Stonefield Court, Alpharetta, GA 30004, Phone 800.955.2343.
- B. Form column covers to shapes indicated from metal of type and minimum thickness indicated below. Return vertical edges and bend to form hook that engages continuous mounting clips.
 - 1. Aluminum Sheet: ASTM B209, with not less than strength and durability properties of Alloy 5005-H32, 0.090 inch thick.
 - a. Finish: Kynar 2 Coat- Fluoropolymer.
 - b. Color: As selected by Architect.
 - 2. Configuration and location: 8-inch full round, length and locations as indicated on Drawings.
 - 3. Provide column covers in sections allowable by manufacturer and as reviewed by Architect for horizontal joint locations.
 - 4. Form returns at vertical joints to provide manufacturer's minimum width Soft “v” Butt joint with interlocking clips.
 - 5. Fabricate column covers with no exposed fasteners.
 - 6. Provide additional bracing components as necessary to stiffen substructure and insure solid mid-span bracings and connections.

2.2 ENTRYWAY PEDESTAL BOLLARDS

- A. Basis of Design: Subject to compliance with project requirements, Basis of Design is architectural pedestal bollard #ADA-SS-BOL-48x5RxP with custom cutouts, manufactured by Pedestal PRO, LLC, 947 W 500 N, Suite 101, Lindon, UT 84042, Phone 800.660.3072.
 - 1. Configuration and location: Interior and Exterior locations as indicated on Drawings. 48-inch-tall round tube with tapered top and custom cutouts for card reader and ADA door actuator within pedestal for an integrated architectural appearance.
 - 2. Diameter: Manufacturer's standard to meet project requirements.
 - 3. Material: Manufacturer's heavy duty stainless steel.
 - 4. Finish and sheen: Powder coated oil rubbed bronze, to be approved by Architect.
 - 5. Fasteners: Manufacturer's standard concealed fasteners for application and mounting condition.
 - 6. Installed pedestal bollards to meet structural and accessibility requirements of Authorities Having Jurisdiction.

2.3 MISCELLANEOUS MATERIALS

- A. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined. Do not use exposed fasteners.
- B. Backing Materials: Provided or recommended by manufacturer for application.

2.4 PAINTS AND COATINGS

- A. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.5 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and 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.
 - 1. Color and Gloss: As selected by Architect.

2.6 STEEL FINISHES

- A. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or with SSPC-SP 8, "Pickling."

- B. Pretreatment: Immediately after cleaning, apply a conversion coating of type suited to organic coating applied over it.
- C. Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils. Prepare, treat, and coat metal to comply with resin manufacturer's written instructions.
 - 1. Color and Gloss: As selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine job-site for conditions that may adversely affect installation of column covers.
- B. Verify dimensions of column covers and entryway pedestals prior to installation to assure compatibility with job-site conditions.
- C. Verify post, floor, or other interior and exterior structure is plumb, level, and parallel prior to installation.
- D. Prior to installation, visually examine finished surfaces to assure that blemished or dented surfaces are not present. Do not install if damaged.
- E. Verify and coordinate installation with other trades prior to installation insofar as they are affected by column cover or entryway pedestal installation.

3.2 INSTALLATION

- A. General: Install product components in accord with manufacturer's installation instructions and approved shop drawings.
- B. Column Cover Installation: Locate and place column covers plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install column covers.
 - 1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
 - 2. Anchor components to related structures such as floors, walls and beams as indicated on approved shop drawings. Use anchors with holding strength to provide a solid installation. Use only plated, galvanized or stainless-steel anchors. Use concealed anchorages where possible.
 - 3. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.
- C. Entryway Pedestal Installation: Locate and install pedestal bollards according to Manufacturer's instructions, plumb and where indicated on Drawings.
 - 1. Coordinate installation with associated trades for access control and power.

2. Use concealed fasteners as required for installation and as directed by Manufacturer for application.

D. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.

3.3 CLEANING

A. Remove protective coverings and clean to remove adhesives and tape residue. Test all solvents on non-exposed surfaces prior to use. Follow manufacturer's written cleaning instructions for proper cleaning procedures for column cover finishes.

B. Visually inspect all exposed surfaces for scratches or blemishes.

C. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

D. Protect from damage during remainder of construction period.

END OF SECTION 055813

SECTION 055923 – AUDITORIUM CATWALKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Preassembled steel catwalks with treads.
 - 2. Steel tube railings attached to steel catwalks.
 - 3. Steel tube handrails attached to walls adjacent to steel catwalks.
 - 4. Railing gates at the level of exit discharge.
- B. Related Requirements:
 - 1. Section 055213 "Pipe and Tube Railings" for pipe and tube railings.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for steel catwalks. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Coordinate locations of hanger rods and struts with other work so that they connect directly to upper roof channel framing.

1.4 ACTION SUBMITTALS

- A. Product Data:
 - 1. Paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Delegated-Design Submittal: For catwalks and railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. 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. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design catwalks and railings.
- B. Structural Performance of catwalks: Steel catwalks shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load: 400 lbf/sq. ft..
 - 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Catwalk hanger configurations should not exceed loading capacities listed for supporting roof trusses shown on structural roof framing plan.
 - 5. Catwalk Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 6. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.
- C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.

2.3 FASTENERS

- A. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099100 "Painting," and Section 099600 "High-Performance Coatings."
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

2.5 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
- B. Preassembled Catwalks: Assemble catwalks in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
 - 1. At lighting catwalk positions, furnish ¼" ASTM A36 steel plate floor decking with maximum 3/32" gap between plates.
 - 2. At access catwalks connecting lighting catwalks to each other and to access stairs, furnish slip-resistant grade 2 expanded metal grating meeting OSHA standard 1910.24
- C. Field assembly of system components shall be permissible so long as all performance and technical requirements of this Specification are met.
- D. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- E. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- F. Form exposed work with accurate angles and surfaces and straight edges.
- G. Weld connections to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Weld exposed corners and seams continuously unless otherwise indicated.
 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: partially dressed weld with spatter removed.
- H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.6 STEEL-FRAMED CATWALKS

- A. Catwalk Floor Decks:
1. Cut deck panels from steel diamond plate.
 2. Stair treads and transition deck panels shall be expanded metal, diamond plate, or shall have non-skid textured surface.
- B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Service Class, unless more stringent requirements are indicated.
- C. Stair Framing:
1. Fabricate stringers of steel channels.
 2. Construct walking surface at treads and landings of slip-resistant grade 2 expanded metal meeting OSHA standard 1910.24.
 3. Construct framing members as needed to comply with performance requirements.
 4. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers.

2.7 STAIR RAILINGS

- A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."
- B. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
1. Lighting Rails and Hand Rails: 1.9-inch- diameter standard 1 1/2 inch Pipe.
 2. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with cam-type, self-closing spring hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.
- C. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: partially dressed weld with spatter removed as shown in NAAMM AMP 521.

- D. Form changes in direction of railings as follows:
 - 1. As detailed.
 - 2. By bending or by inserting prefabricated 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 members with prefabricated end fittings.
- G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- H. Connect posts to catwalk 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. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
 - 1. For nongalvanized railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
- 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. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.8 FINISHES

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

PART 3 - EXECUTION

3.1 INSTALLING STEEL CATWALKS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing steel catwalks to in-place construction. 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 steel catwalks by welding catwalk framing to steel structure.
- D. Provide temporary bracing or anchors 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 but cannot be shop welded because of shipping size limitations.
- F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

3.2 INSTALLING RAILINGS

- A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:
 - 1. Anchor posts to steel by welding or bolting to steel supporting members.
 - 2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.
- B. Attach handrails to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as required to comply with performance requirements.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099100 "Painting," and Section 099600 "High-Performance Coatings."

END OF SECTION 055923

SECTION 057300 - DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Copper-alloy decorative railings where indicated in Drawings.

1.3 DEFINITIONS

- A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas and for pedestrian guidance and support, visual separation, or wall protection.

1.4 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not meet structural performance requirements.

1.5 PREINSTALLATION MEETINGS

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

1.6 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of railings assembled from standard components.
 - 2. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, and attachment details.

- C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.
- D. Samples for Verification: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Fittings and brackets.
 - 3. Welded connections.
 - 4. Brazed connections.
 - 5. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

- A. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- B. Welding certificates.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E894 and ASTM E935.
- D. Preconstruction test reports.

1.8 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 D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockups for each form and finish of railing consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than 24 inches in length.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Copper-Alloy Decorative Railings:
 - 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. Architectural Metal Works.
 - b. Blum, Julius & Co., Inc.
- B. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated. See Section 016000 "Product Requirements."
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.
- B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - 1. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
 - 2. Copper Alloys: 60 percent of minimum yield strength.
 - 3. Stainless Steel: 60 percent of minimum yield strength.
 - 4. Steel: 72 percent of minimum yield strength.
- C. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:

- a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior railings by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.
1. Provide formed-steel brackets with predrilled hole for bolted anchorage and with snap-on cover that matches rail finish and conceals bracket base and bolt head.

2.4 COPPER ALLOYS

- A. Copper and Copper Alloys, General: Provide alloys indicated and with temper to suit application and forming methods, but with strength and stiffness not less than Temper H01 (quarter hard) for plate, sheet, strip, and bars and Temper H55 (light drawn) for tube and pipe.
- B. Extruded Shapes, Bronze: ASTM B455, Alloy UNS C38500 (architectural bronze).
- C. Castings, Bronze: Composition bronze castings complying with ASTM B62, Alloy UNS C83600 (85-5-5-5 or No. 1 composition commercial red brass) or sand castings complying with ASTM B584, Alloy UNS C86500 (No. 1 manganese bronze).

2.5 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
1. Copper-Alloy (Bronze) Components: Silicon bronze (Alloy 651 or Alloy 655) fasteners where concealed; muntz metal (Alloy 280) fasteners where exposed.
 2. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
 3. Galvanized-Steel Components: Plated-steel fasteners complying with ASTM B633, Class Fe/Zn 25 for electrodeposited zinc coating.
 4. Dissimilar Metals: Type 304 stainless-steel fasteners.
- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

- C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless exposed fasteners are the standard fastening method for railings indicated.
 - 1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
 - 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Brazing Rods: For copper-alloy railings, provide type and alloy as recommended by producer of metal to be brazed and as required for color match, strength, and compatibility in fabricated items.
- C. Lacquer for Copper Alloys: Clear acrylic lacquer specially developed for coating copper-alloy products.
- D. 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.
- E. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat. Shop Primer for Galvanized Steel: Water-based galvanized metal primer complying with MPI#134.
- F. Epoxy Intermediate Coat: Complying with MPI#77 and compatible with primer and topcoat.
- G. Polyurethane Topcoat: Complying with MPI#72 and compatible with undercoat.
- H. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- I. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- J. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - 1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.7 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds; no evidence of a welded joint.
- I. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- J. Form changes in direction by bending to smallest radius that will not result in distortion of railing member.
- K. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- L. Close exposed ends of hollow railing members with prefabricated end fittings.
- M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.

- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and to prevent bracket or fitting rotation and crushing of substrate.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- P. For railing posts set in concrete, provide stainless-steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.
- Q. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.8 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.9 COPPER-ALLOY FINISHES

- A. Finish designations for copper alloys comply with the system for designating copper-alloy finish systems defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."
- B. Hand-Rubbed Finish: M31-M34 (Mechanical Finish: directionally textured, fine satin; Mechanical Finish: directionally textured, hand rubbed).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat concealed surfaces of aluminum and copper alloys that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

- A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- C. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.
- D. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members.

3.5 ATTACHING RAILINGS

- A. Anchor railing ends to concrete and masonry with flanges connected to railing ends and anchored to wall construction with anchors and bolts.
- B. Attach handrails to walls with wall brackets except where end flanges are used. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
 - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 - 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Secure wall brackets to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For steel-framed partitions, fasten brackets directly to steel framing or concealed steel reinforcements using self-tapping screws of size and type required to support structural loads.

3.6 FIELD QUALITY CONTROL

- A. Extent and Testing Methodology: Testing agency will randomly select completed railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Test railings according to ASTM E894 and ASTM E935 for compliance with performance requirements.

- B. Remove and replace railings where test results indicate that they do not comply with specified requirements unless they can be repaired in a manner satisfactory to Architect and comply with specified requirements.
- C. Perform additional testing and inspecting, at Contractor's expense, to determine compliance of replaced or additional work with specified requirements.

3.7 CLEANING

- A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.
- B. Clean copper alloys according to metal finisher's written instructions in a manner that leaves an undamaged and uniform finish matching approved Sample.
- C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

3.8 PROTECTION

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

END OF SECTION 057300

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Framing with dimension lumber.
 - 1. Wood blocking and nailers.
 - 2. Plywood backing panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
- B. Sustainable Design Submittals:
 - 1. Environmental Product Declaration (EPD): For each product.
 - 2. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
 - 3. Chain-of-Custody Qualification Data: For manufacturer and vendor.
 - 4. Product Data: For installation adhesives, indicating VOC content.
 - 5. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Preservative-treated wood.
 - 2. Fire-retardant-treated wood.
 - 3. Power-driven fasteners.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Regional Materials: Dimension lumber shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

- B. Certified Wood: Lumber and plywood shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
- C. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Dress lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- 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, meeting Sustainability Requirements, and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 3. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664, and design value adjustment factors shall be calculated according to ASTM D6841. For enclosed roof framing, framing in attic spaces, and where high-temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- C. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- D. Application: Treat items indicated on Drawings, and the following:
1. Framing for raised platforms.
 2. Concealed blocking.
 3. Roof framing and blocking.
 4. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
 5. 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. Rooftop equipment bases and support curbs.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 15 percent maximum moisture content of Construction or No. 2 Common grade.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where 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 A153/A153M or Type 304 stainless steel.
- B. Screws for Fastening to Metal Framing: ASTM C954, length as recommended by screw manufacturer for material being fastened.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Adhesives shall have a VOC content of 70 g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, 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.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

- D. Do not splice structural members between supports unless otherwise indicated.
- E. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- F. Securely attach 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.
 - 2. ICC-ES evaluation report for fastener.

END OF SECTION 061053

SECTION 061600 - SHEATHING

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. Section Includes:
1. Wall sheathing.
 2. Roof sheathing.
 3. Composite nail base insulated roof sheathing.
 4. Sheathing joint and penetration treatment.
 5. Vapor retarder under nail base insulated roof sheathing.
- B. Related Requirements:
1. Section 061053 – Miscellaneous Rough Carpentry for plywood backing panels.
 2. Section 072726 – Fluid-Applied Membrane Barriers for non-permeable barrier applied over wall sheathing.
 3. Section 072419 – Water Drainage Exterior Insulation and Finish System (EIFS).
 4. Section 07311 – Asphalt Shingles.
 5. Section 075423 – Thermoplastic-Polyolefin (TPO) Roofing

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
 3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Sustainable Design Submittals:

1. <Double click to insert sustainable design text for certified wood.>
2. <Double click to insert sustainable design text for certified wood.>
3. <Double click to insert sustainable design text for composite wood.>
4. <Double click to insert sustainable design text for installation adhesives.>

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:

1. Preservative-treated plywood.
2. Fire-retardant-treated plywood.
3. Foam-plastic sheathing.

1.5 PERFORMANCE REQUIREMENTS

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

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of air-barrier and water-resistant glass-mat gypsum sheathing.

1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

B. Testing Agency Qualifications:

1. For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
2. For testing and inspecting agency providing tests and inspections related to air-barrier and water-resistant glass-mat gypsum sheathing: an independent agency, qualified according to ASTM E329 for testing indicated, and certified by Air Barrier Association of America, Inc.

C. <Double click to insert sustainable design text for manufacturer qualifications.>

D. <Double click to insert sustainable design text for vendor qualifications.>

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- B. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing Performance: Air-barrier and water-resistant glass-mat gypsum sheathing 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, tie-ins to installed waterproofing, tie-ins to other installed air barriers, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.2 WOOD PANEL PRODUCTS

- A. Plywood: DOC PS 1.
- B. <Double click to insert sustainable design text for certified wood.>
- C. Oriented Strand Board: DOC PS 2.
- D. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- E. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with the ground; Use Category UC3b for exterior construction not in contact with the ground; Use Category UC4a for items in contact with the ground.

- B. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- C. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- D. Application: Treat plywood in contact with masonry or concrete or used with roofing, flashing, and waterproofing.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Any wood sheathing or wood used shall be fire retardant treated to comply with non-combustible construction. Use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. 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.
 - 4. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305.
- C. Kiln-dry material after treatment to maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood roof sheathing and other locations where indicated on Drawings.

2.5 WALL SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corporation; GlasRoc.
 - b. G-P Gypsum Corporation; Dens-Glass Gold.

- c. United States Gypsum Co.; Securock.
 2. Type and Thickness: Regular, thickness as indicated on Drawings.
- B. Cementitious Backer Units: ASTM C 1325, Type A.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Custom Building Products; Wonderboard.
 - b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
 - c. USG Corporation; DUROCK Cement Board.
 2. Thickness: 1/2 inch, unless otherwise indicated on Drawings.

2.6 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing, thickness as indicated on Drawings.
- B. Glass Mat Gypsum Cover Board: ASTM C 1177, glass-mat, water-resistant gypsum substrate, thickness as indicated on Drawings; equal to Georgia-Pacific Corporation; Dens Deck Prime.
- C. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.7 COMPOSITE NAIL BASE INSULATED ROOF SHEATHING

- A. Ventilated Nail Base Sheathing: Rigid, cellular, polyisocyanurate thermal insulation complying with ASTM C 1289, Type II, Class 1, with oriented strand board adhered to spacers on one face.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Rmax, Inc.
 - b. Hunter Panels
 - c. Atlas Roofing Corp.
 2. Polyisocyanurate-Foam Insulation:
 - a. Thickness: As indicated on Drawings.
 - b. Compressive Strength: 20 psi.
 3. Oriented-Strand-Board Nominal Thickness: As indicated on Drawings.
 4. Spacers: Wood furring strips or blocks not less than 3/4 inch thick and spaced not more than 12 inches o.c.

2.8 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Where such sheathing is used as part of a fire-resistance rated assembly, fasteners shall comply with the tested assemblies in type, size, spacing, etc., in addition to complying with the manufacturers' installation instructions.

- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening Plywood Sheathing to Cold-Formed Metal Framing: ASTM C 954, hot-dip zinc coating complying with ASTM A 153, with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, hot-dip zinc coating complying with ASTM A 153.
 - 1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.
- G. Screws for Fastening Ventilated Nail Base 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 B 117. Provide washers or plates if recommended by sheathing manufacturer.

2.9 MISCELLANEOUS MATERIALS

- A. Where miscellaneous materials are used are part of a fire-resistance rated assembly, comply with the tested assemblies in type, size, spacing, etc., in addition to complying with the manufacturers' installation instructions.
- B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
- C. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing.
- D. Vapor Retarder for Roofing: Basis of Design: Soprema SOPRAVAP'R Vapor Barrier.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 PLYWOOD PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Screw to cold-formed metal framing.
 - 2. Space panels 1/8 inch apart at edges and ends.

3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 3. Install boards with a 1/4-inch gap where sheathing abut masonry or similar materials that might retain moisture, to prevent wicking.

- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- E. Seal sheathing joints according to sheathing manufacturer's written instructions.
 - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

3.4 CEMENTITIOUS BACKER UNIT INSTALLATION

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

END OF SECTION 061600

SECTION 062023.13 – STAGE FLOOR CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes stage floor construction consisting of double tempered hardboard, hardwood trim boards, plywood subflooring, wood sleepers and headers, felt underlayment, insulation, and resilient pads.
- B. Related Requirements:
 - 1. Division 09 Painting section for requirements for priming and painting stage floor construction.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Samples for Verification:
 - 1. For each species and cut of lumber and panel products with non-factory-applied finish, with 1/2 of exposed surface finished, 50 sq. in. for lumber and 8 by 10 inches for panels.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For fire-retardant-treated wood, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored

in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

- C. Allow hardwood flooring to acclimate in the space in which it will be installed for minimum of three days before beginning installation.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install wood materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and the following grading rules:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association, "Standard Grading Rules for Northeastern Lumber."
 - 2. NHLA: National Hardwood Lumber Association, "Rules for the Measurement and Inspection of Hardwood & Cypress."
 - 3. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
 - 4. SPIB: The Southern Pine Inspection Bureau, "Standard Grading Rules for Southern Pine Lumber."
 - 5. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
 - 6. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."
- B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
 - 1. For exposed lumber, mark grade stamp on end or back of each piece.
- C. Softwood Plywood: DOC PS 1.
- D. Hardboard: AHA A135.4. Tempered grade, 1/4 inch thick, smooth both faces.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: For applications indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction, and comply with testing requirements; testing 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, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent respectively.
- C. Do not use material that does not comply with requirements for untreated material or is warped or discolored.
- D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- E. Application: Plywood subflooring; hardwood lumber trim; sleepers, blocking, and headers.

2.3 STAGE FLOOR MATERIALS

- A. Resilient Pads: EPDM pads of thickness and durometer indicated.
- B. Mineral Wool Blanket: 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.
- C. Lumber: DOC PS 20.
- D. Softwood Plywood: APA rated, 5/8 inch thick or as indicated on Drawings, Grade C or better, span rated for floor loading.
- E. Double Tempered Pressed Hardboard:
 - 1. Thickness: 1/4-inch dual face.
 - 2. Tempered, both sides; 54 lbs/cu. ft. density.
 - 3. Solid core, moisture resistant.
- F. Hardwood Lumber Trim for Opaque Finish:
 - 1. Species and Grade: Alder, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar; A Finish; NHLA.
 - 2. Maximum Moisture Content: 13 percent.
 - 3. Finger Jointing: Not allowed.
 - 4. Face Surface: Surfaced (smooth).
- G. Plywood Subflooring:
 - 1. DOC PS 1, Exterior B-C with fully sanded face.

2. Nominal thickness: 3/4-inch.
 3. Span rated for floor loading.
- H. Wood sleepers, blocking, and headers:
1. Refer to Section 061053 "Miscellaneous Rough Carpentry."
- I. Resilient Wall Base: Molded, vented, rubber or vinyl cove base, 4 inches by 3 inches by 48 inches length, with premolded outside corners.
- J. Asphalt-Saturated Felt: ASTM D 4869, #15.
- K. Threshold Expansion Plates:
1. 1/4 inch thick steel plate: ASTM A 36/A 36M. Free of seam and roller marks, stamping, or blemishes.
 2. Fasten upper plates to blocking so that they rest on lower plate without fasteners, permitting movement of joints.

2.4 MISCELLANEOUS MATERIALS

- A. Fasteners: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
1. Fasteners for tempered hardwood: min. 1" hardened spiral thread screws, countersunk so that head does not protrude above surface and is not more than 1/16 inch below surface. Screw down only. Do not nail, staple, or glue. Do not use drywall screws.
 2. Fasteners for plywood subfloor: 1-5/8" screws. Do not use drywall screws.
 3. Fasteners for resilient pads: screws, nails or staples. Fasten in waffle depressions so that fastener remains below pad surface when compressed.
 4. Fasteners for steel plate: Minimum #12-11 x 1-1/14 inch flat head wood screws. Pilot and countersink plate at each fastener location.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

- B. Before installing stage floor, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.
- B. Install stage floor level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Where face fastening stage floor, countersink fasteners flush, and sand unless otherwise indicated.
 - 2. Install to tolerance of 1/8 inch in 96 inches for level and plumb.
 - 3. At intersection with walls, leave 1 inch – 2 inch wide expansion void, or as indicated in Drawings. Install resilient wall base over expansion void at intersections with walls.

3.4 INSTALLATION

- A. Do not use adhesives of any kind.
- B. Sleepers: Lay out sleepers 12 inches on center in as long lengths as practical on resilient pads stapled or nailed to sleepers and spaced 12 inches on center. Start at center of area and work outward toward the sides. Install wood fire stopping between all sleepers over 45 feet in length at the midpoint of their length.
- C. Plywood Subflooring: Over the sleepers, starting at the back of the stage, install 2 layers of plywood subflooring parallel to proscenium wall separating each layer by felt as indicated.
 - 1. To prevent buckling, 1/8" spacing at the panel edge joints shall be maintained.
 - 2. Panels shall be installed perpendicular to sleepers, end joints staggered 48 inches. Stagger joints in panel short direction as well (24" offsets) to ensure panel joints do not overlap in either direction. Secure subflooring to sleepers with screws at 12 inch o.c. around perimeter and 24 inch o.c. at interior.
- D. Sound Insulation: At Stage floor, install sound stopping insulation in sleeper area and at perimeter as detailed.
- E. Preparation of Finish Hardboard Floor Panels: Before floor panels can be installed, sand and prime paint. Panels shall be pre-sanded lightly on both sides to remove glossy surface and prepare material for primer. After sanding, panels shall be pre-primed on both sides and all edges, deliver to the site for installation and finish painting.
- F. Installation of Finish Floor Panels:
 - 1. Once the subflooring is in place and inspected, install the pressed hardboard panels using screw pattern shown on the drawings. Start at the proscenium wall and locate the first panel on the centerline of the stage and work toward side walls and upstage wall. Stagger joints 36-inch o.c. to avoid hitting joints and nails in plywood below. Pilot holes and countersinking are required. Attach to plywood subfloor using power driven screws for

proper fastening until flush by sight and feel. Do not allow screw heads to fully penetrate the panel – any such panel shall be rejected.

2. Lay out several sheets ahead of screw operation. Panels shall be loosely butted. Do not force joints tight. Maximum space panels at any point shall be 1/16". Cut neatly at perimeter walls and thresholds where expansion strips and millwork abutt the edges.
3. Where applicable, install all floor pockets, expansion covers, and vented steel base angles.
4. After floor panels are installed, lightly power sand at joints and screw heads to eliminate unevenness and warping for a smooth, level transition from panel to panel.
5. Following installation of floor panels and light touch-up power sanding, respray all areas of floor with primer where primer has been sanded. When dry, vacuum clean and immediately apply finish using an airless spray application.

- G. Trim at Stage: Cut and fit all millwork strips and trim to panel edges, all trim pieces are to be scribed and properly fitted.

3.5 ADJUSTING

- A. Replace materials that are damaged or do not comply with requirements.

3.6 CLEANING

- A. Clean exposed and semiexposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes, if any.

3.7 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace materials that are wet, moisture damaged, and mold damaged.
1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062023.13

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior standing and running trim.
 - 2. Closet and utility shelving.
 - 3. Interior frames and jambs.
 - 4. Interior stairs and railings.
 - 5. Miscellaneous materials, including concealed sliding fasteners for Orchestra Pit removable panels, and wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork items that are not concealed within other construction.
 - 6. Shop priming of interior architectural woodwork.
 - 7. Shop finishing of interior architectural woodwork.
- B. Related Requirements:
 - 1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing interior architectural woodwork that are concealed within other construction before interior architectural woodwork installation.

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections, to ensure that interior architectural woodwork can be supported and installed as indicated.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Anchors.
 - 2. Adhesives.

3. Shop finishing materials.
 4. Wood-Preservative Treatment:
 - a. Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
 - b. Indicate type of preservative used and net amount of preservative retained.
 - c. Include chemical-treatment manufacturer's written instructions for finishing treated material and manufacturer's written warranty.
 5. Fire-Retardant Treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
 6. Waterborne Treatments: For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Sustainable Design Submittals:
1. Environmental Product Declaration: For each product.
 2. Health Product Declaration: For each product.
 3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
 4. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
 5. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 6. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings:
1. Include the following:
 - a. Dimensioned plans, elevations, and sections.
 - b. Attachment details.
 - c. Hardware locations and details, including concealed sliding fasteners at removable panels at Orchestra Pit wall.
 2. Show large-scale details.
 3. Show locations and sizes of furring, blocking, attachments, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
 4. Apply AWI Quality Certification Program label to Shop Drawings.
- D. Samples: For each exposed product and for each shop-applied color and finish specified.
1. Size:
 - a. Panel Products: 12 inches by 12 inches.
 - b. Lumber Products: Not less than 5 inches wide by 12 inches long or as size indicated on drawing, for each species and cut, finished on one side and one edge.
- E. Samples for Verification: For the following:
1. Lumber for Transparent Finish: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.
 2. Veneer Leaves: Representative of and selected from flitches to be used for transparent-finished interior architectural woodwork.
 3. Lumber and Panel Products with Shop-Applied Opaque Finish: 5 inches wide by 12 inches long for lumber and 12 by 12 inches for panels, for each finish system and color.
 - a. Finish one-half of exposed surface.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For architectural woodwork manufacturer and Installer.
- B. Product Certificates: For the following:
 - 1. Composite wood and agrifiber products.
 - 2. Adhesives.
- C. Evaluation Reports: For preservative-treated and fire-retardant-treated wood materials, from ICC-ES.
- D. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.8 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 - 1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
 - 2. Installer Qualifications: Manufacturer of products.
- 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 Theater Wood Deflection/Refraction Walls.
 - 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.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Architectural Woodwork Standards, Section 2.
- B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.
- C. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
 - 1. Handle and store fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.11 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Frames: Complying with NFPA 80 and 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 according to NFPA 252 or UL 10C.
 - 1. Smoke- and Draft-Control Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.2 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.

1. Provide labels and certificates from AWI certification program indicating that woodwork and installation complies with requirements of grades specified.
 2. The Contract Documents contain requirements that are more stringent than the Architectural Woodwork Standards. Comply with Contract Documents and Architectural Woodwork Standards.
- B. Regional Materials: Wood products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- C. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.

2.3 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: Custom.
- B. Hardwood Lumber:
1. Species: White oak.
 2. Cut: Rift cut/rift sawn.
 3. Wood Moisture Content: 5 to 10 percent.
 4. For trim items other than base wider than available lumber, use veneered construction. Do not glue for width.
 5. For base wider than available lumber, glue for width. Do not use veneered construction.

2.4 INTERIOR FRAMES AND JAMBS FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: Custom.
1. Species: White oak.
 2. Cut: Rift cut/rift sawn.
 3. Wood Moisture Content: 5 to 10 percent.
- B. For frames or jambs wider than available lumber, use veneered construction. Do not glue for width.
1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
- C. Fire-Rated Interior Frames and Jambs: Products fabricated from fire-retardant particleboard or fire-retardant MDF with veneered exposed surfaces and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
1. Fire Rating: 20 minutes.

2.5 HARDWOOD SHEET MATERIALS

- A. Composite Wood and Agrifiber 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. Recycled Content of MDF and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
 2. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
 3. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
 4. Particleboard: ANSI A208.1, Grade M-2.
 5. Particleboard: Straw-based particleboard complying with requirements in ANSI A208.1, Grade M-2, except for density.
 6. Softwood Plywood: DOC PS 1, medium-density overlay.
 7. 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 according to 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 according to 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 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 after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking shop certified by testing and inspecting agency.
 4. 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 according to ASTM E84.
 - 1. For panels 3/4 inch thick and less, comply with ANSI A208.1 for Grade M-2, except for the following minimum properties: modulus of rupture, 1600 psi; modulus of elasticity, 300,000 psi; internal bond, 80 psi; and screw-holding capacity on face and edge, 250 and 225 lbf, respectively.
 - 2. For panels 13/16 to 1-1/4 inches thick, comply with ANSI A208.1 for Grade M-1, except for the following minimum properties: modulus of rupture, 1300 psi; modulus of elasticity, 250,000 psi; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf, 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 according to ASTM E84.

2.7 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Nailers: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.
 - 1. Preservative Treatment: Provide softwood lumber treated by pressure process, AWWPA U1; Use Category UC3b.
 - a. Provide where in contact with concrete or masonry.
 - b. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
 - c. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - d. Mark lumber with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee's (ALSC) Board of Review.
 - 2. Fire-Retardant Treatment: Complying with requirements; provide where indicated.
- B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
 - 1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
 - 2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- D. Concealed Sliding Fasteners: For removable panel at Orchestra Pit railing.
 - 1. Basis of Design: Subject to project requirements, Basis of Design product and manufacturer is UV-T Concealed Hook Connector Timber-Timber, manufactured by Timber Frame Headquarters, Mountain Rest, SC (888) 552-9379.
 - 2. Size and quantity: Suitable for application and ease of panel removal by Owner.
 - 3. Refer to Drawings for details and locations.
- E. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- F. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.
 - 1. Adhesives shall have a VOC content of 70g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

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 unless otherwise indicated.
- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.
 - 1. Disassemble components only as necessary for shipment and installation.
 - 2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
 - 3. Notify Architect seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.
 - 4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.
 - a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
 - b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

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 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: Custom.
 2. Finish: System - 1, Lacquer, Nitrocellulose.
 3. Finish: System - 2, Lacquer, Pre Catalyzed.
 4. Finish: System - 3, Lacquer, Post Catalyzed.
 5. Finish: System - 9, UV Curable, Acrylated Epoxy, Polyester, or Urethane.
 6. Finish: System - 10, UV Curable, Water Based.
 7. Finish: System - 11, Polyurethane, Catalyzed.
 8. Finish: System - 12, Polyurethane, Water Based.
 9. Finish: System - 13, Polyester, Catalyzed.
 10. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
 11. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter according to 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.
- 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 according to AWPA M4.
- F. Fire-Retardant-Treated Wood: Install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- G. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.
 - 1. Secure with countersunk, concealed fasteners and blind nailing.
 - 2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.
 - 3. For shop-finished items, use filler matching finish of items being installed.
- H. Standing and Running Trim:
 - 1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
 - 2. Do not use pieces less than 60 inches long, except where shorter single-length pieces are necessary.
 - 3. Scarf running joints and stagger in adjacent and related members.
 - 4. Fill gaps, if any, between top of base and wall with latex sealant, painted to match wall.
 - 5. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- I. Concealed Sliding Fasteners at Orchestra Pit removable panels: Install per Manufacturer's instructions for application and ease of removing panels by Owner.

3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through AWT's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
 - 1. Inspection entity shall prepare and submit report of inspection.

3.4 REPAIR

- A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects and to result in interior architectural woodwork being in compliance with requirements of Architectural Woodwork Standards for the specified grade.
- B. Where not possible to repair, replace defective woodwork.
- C. Shop Finish: Touch up finishing work specified in this Section after installation of interior architectural woodwork.
 - 1. Fill nail holes with matching filler where exposed.
 - 2. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.
- D. Field Finish: See Section 099000 "Painting" for final finishing of installed interior architectural woodwork not indicated to be shop finished.

3.5 CLEANING

- A. Clean interior architectural woodwork on exposed and semiexposed surfaces.

END OF SECTION 064023

SECTION 064116 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Plastic-laminate-clad architectural cabinets.
 - 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.
- B. Related Requirements:
 - 1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
 - 2. Section 123623.13 "Plastic-Laminate-Clad Countertops."

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.
- B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 087100 "Door Hardware" to manufacturer of architectural cabinets; coordinate Shop Drawings and fabrication with hardware requirements.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
 2. Health Product Declaration: For each product.
 3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
 4. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
 5. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 6. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings:
1. Include plans, elevations, sections, and attachment details.
 2. Show large-scale details.
 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
 5. Apply AWI Quality Certification Program label to Shop Drawings.
- D. Samples: For each exposed product and for each color and texture specified, in manufacturer's or manufacturer's standard size.
- E. Samples for Initial Selection: For each type of exposed finish.
- F. Samples for Verification: For the following:
1. Plastic Laminates: 8 by 10 inches for each type, color, pattern, and surface finish required.
 - a. Provide one sample applied to core material with specified edge material applied to one edge.
 2. Thermoset Decorative Panels: 8 by 10 inches for each color, pattern, and surface finish.
 - a. Provide edge banding on one edge.
 3. Corner Pieces:
 - a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
 4. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Certificates: For each type of product.
1. Composite wood and agrifiber products.
 2. Thermoset decorative panels.
 3. High-pressure decorative laminate.
 4. Glass.
 5. Adhesives.
- C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

- D. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.8 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 - 1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Manufacturer of products.
- C. 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 architectural cabinets as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between **25 and 55** percent during the remainder of the construction period.
- C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.
- D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
 1. Provide certificates from AWI certification program indicating that woodwork and installation complies with requirements of grades specified.
 2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Architectural Woodwork Standards Grade: Custom.
- C. Regional Materials: Wood products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- D. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
- E. Type of Construction: Frameless.
- F. Door and Drawer-Front Style: Flush overlay.
 1. Reveal Dimension: 1/2 inch.
- G. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
- H. Laminate Cladding for Exposed Surfaces:
 1. Horizontal Surfaces: Grade HGL
 2. Postformed Surfaces: Grade HGP.
 3. Vertical Surfaces: Grade VGS.
 4. Edges: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish.
 5. Pattern Direction: Horizontally for drawer fronts, doors, and fixed panels.
- I. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
 - a. Edges of Plastic-Laminate Shelves: PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish.
 - b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
 - c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
 2. Drawer Sides and Backs: Solid-hardwood lumber.
 3. Drawer Bottoms: Hardwood plywood.
- J. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- K. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 1. Join subfronts, backs, and sides with glued dovetail joints.
- L. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 1. As indicated by laminate manufacturer's designations.
 2. Match Architect's sample.
 3. As selected by Architect from laminate manufacturer's full range in the following categories:
 - a. Solid colors, matte finish.
 - b. Wood grains, matte finish.
 - c. Patterns, matte finish.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 1. Recycled Content of MDF and Particleboard: Preconsumer recycled content not less than 80 percent.
- C. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
 2. Particleboard: ANSI A208.1, Grade M-2.
 3. Straw-Based Particleboard: ANSI A208.1, Grade M-2, except for density.
 4. Softwood Plywood: DOC PS 1, medium-density overlay.

5. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials 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.
 1. Use treated materials that comply with requirements of referenced quality standard. 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 according to 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 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.
- C. Fire-Retardant 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 per ASTM E84.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware."
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Accuride International.
 - b. Blum, Julius & Co., Inc.
 - c. CompX International, Inc.
 - d. Grass America Inc.
 - e. Hardware Resources.
 - f. Hettich America L.P.
 - g. Knape & Vogt Manufacturing Company
 - h. Doug Mockett & Company, Inc.
- B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 135 degrees of opening, self-closing.

- C. Bar Pulls: Back mounted, solid metal, 5 inches on center, 1 1/32" square profile.
- D. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.
- E. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.
- F. Shelf Rests: ANSI/BHMA A156.9, B04013; two-pin plastic with shelf hold-down clip.
- G. Drawer Slides: ANSI/BHMA A156.9.
 - 1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.
 - a. Type: Full extension.
 - b. Material: Zinc-plated steel with polymer rollers.
 - 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 - 3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
 - 4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
 - 5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
 - 6. For computer keyboard shelves, provide Grade 1.
 - 7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.
- H. Door Locks: ANSI/BHMA A156.11, E07121.
- I. Drawer Locks: ANSI/BHMA A156.11, E07041.
- J. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.
- K. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Color: Light Gray or White.
- L. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.
 - 1. Satin Chromium Plated: ANSI/BHMA 626 for brass or bronze base; ANSI/BHMA 652 for steel base.
 - 2. Satin Stainless Steel: ANSI/BHMA 630.
- M. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Adhesive for Bonding Plastic Laminate: Contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive.

2.6 FABRICATION

- A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- D. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual."
 - 1. For glass in frames, secure glass with removable stops.
 - 2. For exposed glass edges, polish and grind smooth.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

SECTION 072100 – THERMAL INSULATION

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 includes, but is not limited to, the following:
 - 1. Glass fiber thermal batt insulation.
 - 2. Glass fiber thermal board insulation.
 - 3. Mineral wool safing insulation.
 - 4. Mineral-wool board insulation.
 - 5. Rigid insulation at foundations.
 - 6. Expanding Spray Polyurethane Foam Insulation.
 - 7. Polyisocyanurate Foam-Plastic Board Insulation.
 - 8. Vapor retarder.
- B. Related Sections: The following Sections include requirements that relate to this Section.
 - 1. Section 033000 – Cast-In-Place Concrete.
 - 2. Section 042200 – Unit Masonry.
 - 3. Section 061053 – Miscellaneous Rough Carpentry
 - 4. Section 061600 – Sheathing.
 - 5. Section 078410 – Firestopping.
 - 6. Division 07 Roofing Sections for roof insulation.
 - 7. Section 092910 – Gypsum Board Assemblies for acoustical insulation.

1.3 SUBMITTALS

- A. Product Data: Submit product data for each type of insulation product specified.
- B. Sustainable Design Submittals:
 - 1. Product Data: For adhesives, indicating VOC content.
 - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 3. Laboratory Test Reports: For insulation, indicating compliance with requirements for low-emitting materials.
- C. Test Reports: Submit product test reports from and based on tests performed by qualified independent testing laboratory evidencing compliance of insulation products with requirements including r-values (aged values for plastic foam insulations), fire performance characteristics,

perm ratings, water absorption ratings, and other properties, based on comprehensive testing of current products.

- D. Research Reports: Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence compliance of plastic foam insulations with building code in effect for Project.

1.4 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per the ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting organization.
 - 1. Surface Burning Characteristic: ASTM E 84.
 - 2. Fire Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.
- B. Single-Source Responsibility for Insulation Products. Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

PART 2 - PRODUCTS

2.1 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards. Sizes and thickness shall fit applications indicated selected from manufacturer's standard thickness, width, and length.
- B. General: Insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental chambers."
- C. Thermal Batt Insulation: Batt insulation produced by combining glass fibers with thermosetting resins to comply with ASTM C 665, Type I, unfaced.
 - 1. Surface Burning Characteristics as per ASTM E 84:
 - a. Flame Spread not to exceed 10.
 - b. Smoke Developed not to exceed 10.

2. Thickness: As indicated on Drawings and to achieve required R value.
 3. Use: For installation at stud space at exterior framing; voids around storefront framing, window framing; above exterior soffits.
 4. Type and Manufacturer: Subject to compliance with requirements specified, acceptable manufacturers and materials include the following:
 - a. Thermal Batt Insulation; Owens Corning
 - b. CertaPro AcoustaTherm Batts; Certainteed Corp.
 - c. Fiber Glass Insulation; Johns Manville.
- D. Extruded Polystyrene Insulation: ASTM C 578, Type IV, extruded polystyrene board, rigid, closed cell type. Include insulation with drainage channels at foundation walls below grade.
1. Surface Burning Characteristics as per ASTM E 84:
 - a. Flame Spread not to exceed 5.
 - b. Smoke Developed not to exceed 175.
 2. Compressive Strength: ASTM D 1621, minimum 25 psi.
 3. Water Absorption: ASTM D 2842, 0.1% by volume maximum.
 4. Water Vapor Permeance: ASTM E 96, maximum 0.8 perms.
 5. Use: Foundation walls.
 6. Manufacturer: Subject to compliance with requirements specified, acceptable manufacturer and material include the following:
 - a. Styrofoam Square Edge; Dow Chemical Co.
 - b. Foamular Square Edge; Owens Corning.
- E. Safing Insulation: ASTM C 612, semi-rigid fiberglass or mineral wool insulation, 4 – 5 lbs/cu.ft. density, units, thickness as indicted on Drawings or as required to fully pack voids.
1. Surface Burning Characteristics as per ASTM E 84:
 - a. Flame Spread: 5.
 - b. Smoke Developed: 0.
 2. Use: Pack voids created by wall intersections at beams; seal gap between top of a partition and slab not constructed full height from floor to slab. Do not use at rated assemblies unless permitted by tested assembly published data.
 3. Characteristics: Dimensionally stable and will not slump within cavity; inorganic; rot, mildew, and vermin proof and shall not corrode steel, copper, or aluminum.
 4. Type and Manufacturer: Subject to compliance with requirements specified, acceptable manufacturers and materials include the following:
 - a. Safing Insulation; Owens Corning
 - b. Safing Insulation; Johns Manville.
 - c. Safing Insulation; Thermafiber.
- F. Unfaced, Mineral-Wool Board Insulation: ASTM C 612; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics. Darkened color fiber where indicated.
1. Insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- G. Minimal Expanding Spray Polyurethane Foam Insulation:
1. Minimal Expanding Sprayed Polyurethane Foam Sealant: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu ft. density.

- a. Flame spread index of 25 or less according to ASTM E 162.
 - b. Manufacturer's recommended primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
 - c. Type and Manufacturer: Subject to compliance with project requirements, Basis of Design product is Great –Stuff PRO manufactured by Dow Chemical Company.
- H. Polyisocyanurate Board, Foil Faced: ASTM C1289, foil faced, Type I, Class 1 or 2. For use below grade installation where indicated in Drawings.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.
 - b. Dow Chemical Company (The).
 - c. Firestone Building Products.
 - d. Johns Manville; a Berkshire Hathaway company.
 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- I. Polyisocyanurate Board, Glass-Fiber-Mat Faced: ASTM C1289, glass-fiber-mat faced, Type II, Class 2.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.
 - b. Firestone Building Products.
 - c. Johns Manville; a Berkshire Hathaway company.
 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 VAPOR RETARDER

- A. Fire Retardant, Reinforced Polyethylene Vapor Retarder: Two (2) outer layers of polyethylene film laminated to inner reinforcing layer consisting of either non-woven grid of nylon cord or polyester scrim and weighing not less than 29 lb/1000 sq. ft., maximum permeance rating of 0.049 grains/hr-sq. ft.-in and flame spread of not more than 5 and smoke developed of not more than 60.
- B. Vapor Retarder Tape: Pressure sensitive tape of type recommended by vapor retarder manufacturer for application for sealing joint and penetrations in vapor retarder.
- C. Manufacturer and Type: Subject to compliance with requirements, provide on of the following:
 1. Reef Industries, Inc.: Griffolyn T-55 FR.
 2. Raven Industries, Inc.: Dura-Skrim 2 FR.
 3. CertainTeed Corp.: MemBrain Vapor Retarder.

2.3 AUXILIARY INSULATING MATERIALS

- A. Adhesive: Product with demonstrated capability to bond insulation or mechanical anchors securely to substrates indicated without damaging or corroding either insulation, anchors, or substrates.
 1. Adhesives shall have a VOC content of 70 g/L or less.

2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Mechanical Fasteners: Perforated plate, 2 inches square, welded to projecting pin, with self-locking washer.
 1. Plate: Zinc-plated steel, 0.030 inch thick.
 2. Pin: Copper-coated low carbon steel, fully annealed, 0.106 inches in diameter, length to suit depth of insulation and, with washer in place, to hold insulation tightly to substrate behind insulation.
 3. Self-Locking Washer: Mild steel, 0.016 inch thick, size or as required to hold insulation securely.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with installer present, for compliance with requirements of the Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.
- B. Clean substrates of harmful to insulations, including removal of projections that might puncture coverings on insulation.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's instructions applicable to products and application indicated. If printed instructions are not available or do not apply to Project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with installation of insulation.
- B. Extend insulation full thickness to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement. Butt panels together for a tight fit and complete installation.
- C. Install board insulation on concrete and masonry substrates by adhesively attached, spindle-type insulation anchors as follows:
 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.

4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
- B. On horizontal surfaces under slabs, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units. Extend insulation as indicated on Drawings.
- C. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to insulation manufacturer's written instructions.
- D. Protect top surface of horizontal insulation from damage during concrete work by applying protection board.

3.3 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

- A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. General: Apply insulation units to substrates by method indicated or, if not indicated, to complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Glass Fiber or Mineral Wool Blanket Insulation: Install in cavities formed by framing members according to manufacturer's recommendations and the following requirements:
 1. Use insulation widths and lengths that fill the cavities formed by framing members. Where 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 product a friction fit between edges on insulation and adjoining framing members.
 3. Maintain 3 inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 5. Stuff insulation into miscellaneous voids and cavity spaces as required to fill voids which occur at exterior walls or areas where insulation blankets do not extend. Compact to approximately 40 percent of normal maximum volume equaling a density equal to or greater that insulation density.
- C. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.

3.5 INSTALLATION OF FOAM-PLASTIC BOARD INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer for application.
1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
 2. Press units firmly against inside substrates.
 3. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose.

3.6 INSTALLATION OF VAPOR RETARDER

- A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as directed by vapor retarder manufacturer. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with batt insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping not les than two wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.
- C. Seal overlapping joints in vapor retarders with adhesives or tape according to vapor-retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor retarder tape. Locate all joints over framing members or other solid substrates.
- D. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as directed by vapor retarder manufacturer.
- E. Seal joints caused by pipes, conduits, electrical boxes, ductwork, structural members, and similar items penetrating vapor retarders with vapor retarder tape to create an airtight seal between penetrating objects and vapor retarder.

3.6 PROTECTION

- A. General: Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072419 - WATER-DRAINAGE EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. EIFS-clad drainage-wall assemblies that are field applied over substrate above grade.
 - 2. Water-resistive barrier coatings.
- B. Related Requirements:
 - 1. Section 072726 "Fluid-Applied Membrane Air Barriers" for fluid-applied, synthetic polymer air barriers applied over sheathing behind EIFS-clad wall assemblies.

1.3 DEFINITIONS

- A. Definitions in ASTM E2110 apply to Work of this Section.
- B. EIFS: Exterior insulation and finish system(s).
- C. IBC: International Building Code.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each EIFS component, trim, and accessory, including water-resistive barrier coatings.
- B. Sustainable Design Submittals:
 - 1. Product Data: For adhesives, indicating VOC content.
 - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 3. Product Data: For coatings, indicating VOC content.

4. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings:
 1. Include details for EIFS buildouts, including field-applied custom pattern as indicated in Drawings.
- D. Samples for Initial Selection: For each type of finish-coat color and texture indicated.
 1. Include similar Samples of exposed accessories involving color selection.
- E. Samples for Verification: 24-inch- square panels for each type of finish-coat color, pattern, and texture indicated, prepared using same tools and techniques intended for actual work, including custom trim, each profile, and an aesthetic reveal.
 1. Include exposed trim and accessory Samples to verify color selected.
 2. Include a typical control joint filled with sealant of color selected, as specified in Section 079200 "Joint Sealants."

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Manufacturer Certificates: Signed by EIFS manufacturer, certifying the following:
 1. EIFS complies with requirements.
 2. Substrates to which EIFS is indicated to be attached are acceptable to EIFS manufacturer.
 3. Accessory products installed with EIFS, including joint sealants, flashing, water-resistive barrier coatings, trim, whether or not furnished by EIFS manufacturer and whether or not specified in this Section, are acceptable to EIFS manufacturer.
- C. Product Certificates: For cementitious materials and aggregates and for insulation and joint sealant, from manufacturer.
- D. Product Test Reports: For each EIFS assembly and component, and for water-resistive barrier coatings, for tests performed by a qualified testing agency.
- E. Field quality-control reports.
- F. Warranty: For manufacturer's standard warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For EIFS to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is certified in writing by AWCI International as qualified to install Class PB EIFS using trained workers.
- B. Mockups: Build full-scale mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area on site as approved by Owner and Architect. Incorporate area to demonstrate custom field-applied pattern as indicated in Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.
- B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.
 - 1. Stack insulation board flat and off the ground.
 - 2. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.
 - 1. Proceed with installation of adhesives or coatings only when ambient temperatures have remained, or are forecast to remain, above 40 deg F (4.4 deg C) for a minimum of 24 hours before, during, and after application. Do not apply EIFS adhesives or coatings during rainfall.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. BASF Corporation.
 - 2. Decoplast; Greenmaker Industries.
 - 3. Dryvit Systems, Inc., Outsulation Plus MD.
 - 4. Sto Corp, Sto Therm ci Classic.
- B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with EIFS components.

2.2 PERFORMANCE REQUIREMENTS

- A. EIFS Performance: Comply with ASTM E2568 and with the following:
 - 1. Weathertightness: Resistant to uncontrolled water penetration from exterior, with a means to drain water entering EIFS to the exterior.
 - 2. System Fire Performance: Fire-resistance rating of wall assembly.
 - 3. Structural Performance of Assembly and Components:
 - a. Wind Loads: Uniform pressure as indicated on Drawings.
 - 4. Impact Performance: ASTM E2568, Standard, except provide Ultra High impact resistance to a minimum height of 6'-0" above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact.
 - 5. Abrasion Resistance of Finish Coat: Sample consisting of 1-inch- thick EIFS mounted on 1/2-inch- thick gypsum board; cured for a minimum of 28 days and shows no cracking, checking, or loss of film integrity after exposure to 528 quarts of sand when tested according to ASTM D968, Method A.
 - 6. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch clean glass substrate; cured for 28 days and shows no growth when tested according to ASTM D3273 and evaluated according to ASTM D3274.
 - 7. Drainage Efficiency: 90 percent average minimum when tested according to ASTM E2273.

2.3 EIFS MATERIALS

- A. Water-Resistive Barrier Coating: EIFS manufacturer's standard formulation and accessories for use as water-resistive barrier coating; compatible with substrate.
 - 1. Water-Resistance: Comply with physical and performance criteria of ASTM E2570/E2570M.
 - 2. VOC Content: 100 g/L or less.
 - 3. Low-Emitting Materials: Coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the

Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- B. Flexible-Membrane Flashing: Cold-applied, self-adhering, self-healing, rubberized-asphalt, and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.
- C. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; specifically formulated to be applied to back side of insulation in a manner that creates open vertical channels designed to serve as an integral part of the water-drainage system of the EIFS-clad drainage-wall assembly; compatible with substrate; and complying with one of the following:
 - 1. Job-mixed formulation of portland cement complying with ASTM C150/C150M, Type I, and polymer-based adhesive specified for base coat.
 - 2. Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.
 - 3. Factory-mixed noncementitious formulation designed for adhesive attachment of insulation to substrates of type indicated, as recommended by EIFS manufacturer.
 - 4. Adhesives shall have a VOC content of 50 g/L or less.
 - 5. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Drainage Mat: Drainage mat designed to drain incidental moisture by gravity; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer, with manufacturer's standard corrosion-resistant mechanical fasteners suitable for intended substrate.
- E. Molded, (Expanded) Rigid Cellular Polystyrene Board Insulation: Comply with ASTM E2430/E2430M, unless otherwise noted, and the following:
 - 1. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, according to ASTM E84.
 - 2. Dimensions: Provide insulation boards of not more than 24 by 48 inches, with thickness indicated on Drawings.
 - 3. Channeled Board Insulation: EIFS manufacturer's standard factory-fabricated profile with linear, vertical-drainage channels, slots, or waves on the back side of board.
 - 4. Foam Buildouts: Provide with profiles and dimensions indicated on Drawings.
- F. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. according to ASTM E2098/E2098M and the following:
 - 1. Reinforcing Mesh for EIFS, General: Not less than weight required to comply with impact-performance level specified in "Performance Requirements" Article.
 - 2. Strip-Reinforcing Mesh: As recommended by EIFS manufacturer for project application.
 - 3. Detail-Reinforcing Mesh: As recommended by EIFS manufacturer for project application.

4. Corner-Reinforcing Mesh: As recommended by EIFS manufacturer for project application.
- G. Base Coat: EIFS manufacturer's standard mixture complying with one of the following:
1. Job-mixed formulation of portland cement complying with ASTM C150/C150M, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
 2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
 3. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
 4. Adhesives shall have a VOC content of 50 g/L or less.
 5. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- H. Water-Resistant Base Coat: EIFS manufacturer's standard water-resistant formulation complying with one of the following:
1. Job-mixed formulation of portland cement complying with ASTM C150/C150M, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
 2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
 3. Adhesives shall have a VOC content of 50 g/L or less.
 4. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- I. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
1. VOC Content: 100 g/L or less.
 2. Low-Emitting Materials: Coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- J. Finish Coat: EIFS manufacturer's standard acrylic-based coating with enhanced mildew resistance complying with the following:
1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
 2. Colors: As selected by Architect from manufacturer's full range.
 3. Textures: As selected by Architect from manufacturer's full range.
- K. Sealer: Manufacturer's waterproof, clear acrylic-based sealer for protecting finish coat.
- L. Water: Potable.

- M. Pattern: Field-applied, custom pattern as indicated in Drawings.
- N. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D1784, manufacturer's standard cell class for use intended, and ASTM C1063.
 - 1. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 - 2. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 - 3. Weep Screed/Track: Prefabricated, one-piece type for attachment behind insulation with perforated face leg, extended to form a drip where applicable, and weep holes in track bottom, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg; designed to drain incidental moisture that gets into wall construction to the exterior at terminations of EIFS with drainage.
 - 4. Expansion Joint: Closed-cell polyethylene backer rod and elastomeric sealant 3/4-inch-minimum.
 - 5. Windowsill Flashing: Prefabricated type for both flashing and sloping sill over framing beneath windows; with end and back dams; designed to direct water to exterior.
 - 6. Parapet Cap Flashing: Type for both flashing and covering parapet top, with design complying with ASTM C1397 and ANSI/SPRI/FM 4435/ES-1.

2.4 MIXING

- A. Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials, except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Follow Manufacturer's written instructions for installation based on project requirements.
 - 1. Begin coating application only after surfaces are dry.
 - 2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind drainage plane of EIFS and deterioration of substrates.
- C. Prepare and clean substrates to comply with EIFS manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.
 - 1. Concrete Substrates: Provide clean, dry, neutral-pH substrate for insulation installation. Verify suitability of substrate by performing bond and moisture tests recommended by EIFS manufacturer.

3.3 EIFS INSTALLATION, GENERAL

- A. Comply with ASTM C1397, ASTM E2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

3.4 SUBSTRATE PROTECTION APPLICATION

- A. Water-Resistive Barrier Coating: Apply over substrate to provide a water-resistive barrier.
 - 1. Tape and seal joints, exposed edges, terminations, and inside and outside corners of sheathing unless otherwise indicated by EIFS manufacturer's written instructions.
- B. Flexible-Membrane Flashing: Install over water-resistive barrier coating, applied and lapped to shed water; seal at openings, penetrations, and terminations. Prime substrates with flashing primer if required and install flashing.

3.5 TRIM INSTALLATION

- A. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, at windowsills, and elsewhere as indicated in Drawings or as required by project application. Coordinate with installation of insulation.
 - 1. Weep Screed/Track: Use at bottom termination edges, at window and door heads, and at floor line expansion joints of water-drainage EIFS unless otherwise indicated.
 - 2. Windowsill Flashing: Use at windows unless otherwise indicated.
 - 3. Expansion Joint: Use where indicated on Drawings.
 - 4. Casing Bead: Use at other locations.
 - 5. Parapet Cap Flashing: Use where indicated on Drawings.

3.6 DRAINAGE MAT INSTALLATION

- A. Drainage Mat: Apply wrinkle free, continuously, with edges overlapped and mechanically secured with fasteners over water-resistive barrier coating.

3.7 INSULATION INSTALLATION

- A. Board Insulation: Adhesively attach insulation to substrate in compliance with ASTM C1397 and the following:
1. Apply adhesive to insulation by notched-trowel method, with notches oriented vertically to produce drainage channels that remain functional after the insulation is adhered to substrate.
 2. Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of drainage mat with adhesive once insulation is adhered to drainage mat.
 3. Apply adhesive to ridges on back of channeled insulation by notched-trowel method in a manner that results in full adhesive contact over the entire surface of ridges, leaving channels free of adhesive once insulation is adhered to substrate.
 4. Press and slide insulation into place. Apply pressure over entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
 5. Allow adhered insulation to remain undisturbed for not less than 24 hours, before beginning rasping and sanding insulation or applying base coat and reinforcing mesh.
 6. Mechanically attach insulation to substrate. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:
 - a. Steel Framing: 5/16 inch.
 - b. Wood Framing: 1 inch.
 - c. Concrete and Masonry: 1 inch.
 7. Apply insulation over substrates in courses with long edges of boards oriented horizontally.
 8. Begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
 9. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints, so no piece of insulation is less than 12 inches wide or 6 inches high. Offset joints not less than 6 inches from corners of window and door openings and not less than 4 inches from aesthetic reveals.
 - a. Adhesive Attachment: Offset joints of insulation not less than 6 inches from horizontal and 4 inches from vertical joints in sheathing.
 - b. Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.
 10. Apply channeled insulation, with drainage channels aligned vertically.
 11. Interlock ends at internal and external corners.
 12. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.

13. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
14. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/16 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch. Prevent airborne dispersal and immediately collect insulation raspings or sandings.
15. Where indicated, cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than 3/4 inch.
16. Install foam buildouts and attach to structural substrate by adhesive.
17. Interrupt insulation for expansion joints where indicated.
18. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
19. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
20. Before installing insulation and before applying field-applied reinforcing mesh, fully wrap board edges. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches over front and back face unless otherwise indicated on Drawings.
21. Treat exposed edges of insulation as follows:
 - a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
 - b. Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
 - c. At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.
22. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and water-resistive barrier coating.

- B. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer, and as follows:
1. At expansion joints in substrates behind EIFS.
 2. Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.
 3. At floor lines in multilevel wood-framed construction.
 4. Where wall height or building shape changes.
 5. Where EIFS manufacturer requires joints in long continuous elevations.

3.8 BASE-COAT APPLICATION

- A. Water-Resistant Base Coat: Apply full-thickness coverage to exposed insulation and to exposed surfaces of sloped shapes, window sills, parapets, and to other surfaces indicated on Drawings.

- B. Base Coat: Apply full coverage to exposed insulation with not less than 1/8-inch dry-coat thickness or as recommended by Manufacturer for project application.
- C. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C1397. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.
- D. Double-Layer Reinforcing-Mesh Application: Where indicated or required, apply second base coat and second layer of reinforcing mesh, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C1397 in same manner as first application. Do not apply until first base coat has cured.
- E. Additional Reinforcing Mesh: Apply strip-reinforcing mesh around openings, extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip-reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- wide, strip-reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches on each side of corners.
 - 1. At aesthetic reveals, apply strip-reinforcing mesh not less than 8 inches wide.
 - 2. Embed strip-reinforcing mesh in base coat before applying first layer of reinforcing mesh.
- F. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application, except without reinforcing mesh. Do not apply until first base coat has cured.

3.9 FINISH-COAT APPLICATION

- A. Primer: Apply over dry base coat.
- B. Finish Coat: Apply full-thickness coverage over dry or primed base coat, maintaining a wet edge at all times for uniform appearance, to produce a uniform finish of color and texture, with custom pattern indicated in Drawings, matching approved sample and free of cold joints, shadow lines, and texture variations.
- C. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

3.10 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - 1. Water-resistive barrier coatings applied over sheathing.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

- C. EIFS Tests and Inspections: According to ASTM E2359/E2359M or as required by Authorities Having Jurisdiction.
- D. EIFS will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.11 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.
- B. Clean and maintain the EIFS for a fresh appearance and to prevent water entry into and behind the system. Repair cracks, impact damage, spalls, or delamination promptly.
- C. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into or behind the EIFS and anywhere into the wall assembly.
- D. Refer to Manufacturer's written materials for repair and maintenance information.

END OF SECTION 072419

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Vapor-retarding, fluid-applied air barriers.
- B. Related Requirements:
 - 1. Section 061600 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.
 - 2. Section 018113.14 "Sustainable Design Requirements – LEED V4 BD+C".

1.3 DEFINITIONS

- A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.

2. Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.
- B. Sustainable Design Submittals:
1. Product Data: For coatings, indicating VOC content.
 2. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For air-barrier assemblies.
1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions.
 2. Shop drawings of mockup: Submit Shop Drawings of proposed mock-ups showing plans, elevations, large-scale details, and air barrier transitions and terminations.
 3. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 4. Include details of interfaces with other materials that form part of air barrier.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by Installer, who work on Project.
- B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.
- C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency, including retesting if initial results are not satisfactory.
- D. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.
- B. Mockups: Build mockups to set quality standards for materials and execution and for preconstruction testing.
1. Build integrated mockups of exterior wall assembly, 150 sq. ft. (14 sq. m), incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
 - a. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.

- b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
- c. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PRECONSTRUCTION TESTING

- A. Mockup Testing: Air-barrier assemblies shall comply with performance requirements indicated, as evidenced by reports based on mockup testing by a qualified testing agency.
 1. Air-Leakage-Location Testing: Mockups will be tested for evidence of air leakage according to ASTM E1186, chamber depressurization with detection liquids.
 2. Air-Leakage-Volume Testing: Mockups will be tested for air-leakage rate according to ASTM E783.
 3. Adhesion Testing: Mockups will be tested for required air-barrier adhesion to substrate according to ASTM D4541.
 4. Notify Architect and Owner minimum seven days in advance of the dates and times when mockups will be tested.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
 1. Protect substrates from environmental conditions that affect air-barrier performance.
 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E2357.

2.3 HIGH-BUILD AIR BARRIERS, VAPOR RETARDING

- A. High-Build, Vapor-Retarding Air Barrier: Modified bituminous or synthetic polymer membrane with an installed dry film thickness, according to manufacturer's written instructions, of 35 mils (0.9 mm) or thicker over smooth, void-free substrates.
 - 1. Modified Bituminous Type:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Carlisle Coatings & Waterproofing Inc.
 - 2) Henry Company.
 - 3) Tremco Incorporated.
 - 2. Synthetic Polymer Type:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Carlisle Coatings & Waterproofing Inc.
 - 2) GCP Applied Technologies Inc.
 - 3) Henry Company.
 - 4) Hohmann & Barnard, Inc.
 - 5) Rubber Polymer Corporation, Inc.
 - 6) Sto Corp.
 - 3. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E2178.
 - b. Vapor Permeance: Maximum 0.1 perm (5.8 ng/Pa x s x sq. m); ASTM E96/E96M, Desiccant Method.
 - c. Ultimate Elongation: Minimum 500 percent; ASTM D412, Die C.
 - d. Adhesion to Substrate: Minimum 16 lbf/sq. in. (110 kPa) when tested according to ASTM D4541.
 - e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - f. UV Resistance: Can be exposed to sunlight for 30 days according to manufacturer's written instructions.

2.4 ACCESSORY MATERIALS

- A. 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.
- B. Primer: Liquid waterborne or solvent-borne primer meeting project requirements and as recommended for substrate by air-barrier material manufacturer.
- C. Stainless-Steel Sheet: ASTM A240/A240M, Type 304, 0.0187 inch (0.5 mm) thick, and Series 300 stainless-steel fasteners.
- D. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
 - 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. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. Pecora Corporation.
 - c. The Dow Chemical Company.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
 - 3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D4263.
 - 4. Verify that masonry joints are flush and completely filled with mortar.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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 grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. 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.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- H. 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.

3.3 ACCESSORIES INSTALLATION

- A. Install accessory 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 (75 mm) 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.
- B. 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.
- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

- E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip or preformed silicone extrusion so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames, with not less than 1 inch (25 mm) of full contact.
 - 1. Transition Strip: Roll firmly to enhance adhesion.
 - 2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- H. Seal top of through-wall flashings to air barrier with an additional 6-inch- (150-mm-) wide, transition strip.
- I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.4 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

- A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
 - 1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 - 2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
 - 3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.
- B. 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 for application to comply with performance requirements, but not less than 35 mils (0.9 mm), applied in one or more equal coats as recommended by manufacturer for application.
- C. Do not cover air barrier until it has been tested and inspected by testing agency.

- D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.5 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 - 2. Air-barrier dry film thickness.
 - 3. Continuous structural support of air-barrier system has been provided.
 - 4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
 - 5. Site conditions for application temperature and dryness of substrates have been maintained.
 - 6. Maximum exposure time of materials to UV deterioration has not been exceeded.
 - 7. Surfaces have been primed, if applicable.
 - 8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 - 9. Termination mastic has been applied on cut edges.
 - 10. Strips and transition strips have been firmly adhered to substrate.
 - 11. Compatible materials have been used.
 - 12. Transitions at changes in direction and structural support at gaps have been provided.
 - 13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 - 14. All penetrations have been sealed.
- D. 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 according to ASTM E1186, chamber depressurization using detection liquids.
 - 2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E783.
 - 3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D4541 for each 600 sq. ft. (56 sq. m) 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.
- G. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 - 1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
 - 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Asphalt shingles.
 - 2. Underlayment.
- B. Related Requirements:
 - 1. Section 077200 "Roof Accessories."
 - 2. Section 076200 "Sheet Metal Flashing and Trim."
 - 3. Division 07 Sections for roof insulation, sheathing, and vapor retarder.
 - 4. DGS Procedure Manual for Professional Services, Roofing Standards, July 2015 or latest edition.

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. Samples: For each exposed product and for each color and texture specified.
 - 1. Asphalt Shingles: Full size.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each type of asphalt shingle and underlayment product indicated, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For synthetic underlayment and high-temperature, self-adhering sheet underlayment, from ICC-ES or other testing and inspecting agency acceptable to authorities

having jurisdiction, indicating that product is suitable for intended use under applicable building codes.

- D. Sample Warranty: For manufacturer's warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For asphalt shingles to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Asphalt Shingles: 100 sq. ft. of each type, in unbroken bundles.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer and meets requirements of the DGS Procedure Manual for Professional Services, Roofing Standards.
 - 1. Installer must have minimum 5 years' experience installing the project-specific type of roofing, be NDL certified roofing system installer for 5 years continuously minimum and concurrently.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture according to manufacturer's written instructions.
- B. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
- C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.
- D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.11 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.
 - 1. Warranty Period: 40 years minimum from date of Substantial Completion, prorated, with first 10 years, or duration as required by Owner and Authorities Having Jurisdiction, nonprorated.
 - 2. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 110 mph for 10 years from date of Substantial Completion, or duration as required by Owner and Authorities Having Jurisdiction.
 - 3. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 10 years from date of Substantial Completion, or duration as required by Owner and Authorities Having Jurisdiction.
 - 4. Workmanship Warranty Period: Two years from date of Substantial Completion, or duration as required by Owner and Authorities Having Jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance according to ASTM E108 or UL 790 by Underwriters Laboratories, Inc. or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Fiberglass-Based Asphalt Shingles: ASTM D3462/D3462M, glass-fiber reinforced, mineral-granule surfaced, and self-sealing; with tabs regularly spaced.
 - 1. Basis of Design: Subject to complying with project requirements, Basis of Design fiberglass-based asphalt shingle is Oakridge Shingles to match existing shingles on Garrett College campus, manufactured by Owens Corning Roofing and Asphalt, LLC, One Owens Corning Parkway, Toledo, Ohio 43659, Phone 800.GET.PINK, www.ownescorning.com/roofing.
 - 2. Strip Size: Manufacturer's standard.
 - 3. Algae Resistance: Granules resist algae discoloration.
 - 4. Impact Resistance: UL 2218, Class 4.
 - 5. Color and Blends: Estate Gray to match existing adjacent asphalt shingles on Garrett College campus.
- B. Hip and Ridge Shingles: Where applicable, manufacturer's standard units to match asphalt shingles.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D226/D226M, asphalt-saturated organic felts, nonperforated.
 - 1. Type: Type I.
- B. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D1970/D1970M, minimum of 40-mil- thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.
 - 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. CertainTeed Corporation.
 - b. GAF.
 - c. Owens Corning.

2.4 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- diameter, sharp-pointed, with a minimum 3/8-inch-diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
 - 1. Shank: Barbed or as recommended by asphalt shingle Manufacturer for application and to meet project requirements.
 - 2. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- C. Felt-Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.
- D. Synthetic-Underlayment Fasteners: As recommended in writing by synthetic-underlayment manufacturer for application indicated.

2.5 METAL FLASHING AND TRIM

- A. General: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

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.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provisions have been made for flashings and penetrations through asphalt shingles.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single-Layer Felt Underlayment: Where applicable, install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with nails as recommended by Manufacturer for application.
1. Where applicable, install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches in direction that sheds water. Lap ends of felt not less than 6 inches over self-adhering sheet underlayment.
 2. Install fasteners at no more than 36 inches o.c.
- C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install lapped in direction that sheds water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.
1. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.

3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings, drip edges, and other sheet metal to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
- B. Rake Drip Edges: Install rake drip-edge flashings over underlayment and fasten to roof deck.
- C. Eave Drip Edges: Install eave drip-edge flashings below underlayment and fasten to roof sheathing.
- D. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT-SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Install starter strip along lowest roof edge, consisting of an asphalt-shingle strip with self-sealing strip face up at roof edge.
 - 1. Extend asphalt shingles 1/4 inch over fasciae at eaves and rakes, unless indicated otherwise.
 - 2. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- E. Fasten asphalt-shingle strips with minimum number of roofing nails specified by Manufacturer for application and in accordance with Authorities Having Jurisdiction, located according to manufacturer's written instructions.
 - 1. Drive all fasteners flush with shingle surface and penetrate at least 3/4 inch. Fasteners should be long enough to fully penetrate and extend through roof sheathing.
 - 2. Where roof slope exceeds 21:12, seal asphalt shingles with asphalt roofing cement spots after fastening with additional roofing nails.
 - 3. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
 - 4. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.
- F. Closed-Cut Valleys: Extend asphalt-shingle strips from one side of valley 12 inches minimum beyond center of valley. Use one-piece shingle strips without joints in valley. 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. Trim upper concealed corners of cut-back shingle strips.
 - 1. Do not nail asphalt shingles within 6 inches of valley center.
 - 2. Set trimmed, concealed-corner asphalt shingles in a 3-inch- wide bed of asphalt roofing cement.
- G. Open Valleys: Cut and fit asphalt shingles at open valleys, trimming upper concealed corners of shingle strips. Maintain uniform width of exposed open valley from highest to lowest point.
 - 1. Set valley edge of asphalt shingles in a 3-inch- wide bed of asphalt roofing cement.
 - 2. Do not nail asphalt shingles to metal open-valley flashings.
- H. Ridge and Eave Vents: Install continuous ridge or eave vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.

- I. 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. Fasten with roofing nails of sufficient length to penetrate sheathing.
 1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION 073113

SECTION 074213.16 - METAL PLATE PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes metal plate panels for exterior walls and soffits in locations indicated on Drawings.
- B. Related Sections:
 - 1. Section 054000 "Cold-Formed Metal Framing."
 - 2. Section 061053 "Miscellaneous Rough Carpentry."
 - 3. Div 07 sections for thermal insulation, weather barriers, and joint sealants.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including, but not limited to, installers of doors, windows, louvers, air-water barrier, wall sheathing, and insulation.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays, and procedures for coordinated installation of wall assembly components by multiple installers and to maintain proper air-water barrier and panel substrate performance requirements.
 - 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
 - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 - 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
 - 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
 - 7. Review temporary protection requirements for metal panel assembly during and after installation.
 - 8. Review procedures for repair of metal panels damaged after installation.

9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
 2. Accessories: Include details of the flashing, trim, and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.

- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer with not less than three years of documented experience.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical metal panel assembly, including corner, soffits, supports, attachments, and accessories. Locate where directed.
 - 2. Water-Spray Test: Conduct water-spray test of mockup of metal panel assembly, testing for water penetration according to AAMA 501.2.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E330:
1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: Normal to the plane of the wall between supports, deflection of the secured perimeter framing members no greater than L/175 or 3/4-inch, whichever is less. Normal to the plane of the wall, the maximum panel deflection shall not exceed L/60 of the full span. No permanent deformation of the panel system allowed.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

- E. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 METAL PLATE WALL PANELS

- A. Metal Plate Wall Panels: Provide factory-formed, metal plate wall panels fabricated from single sheets of metal formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.
 - 1. Subject to project requirements, Basis of Design Manufacturer and Product: Arcwall, manufactured by Metalwerks, 200 Gale Lane, Kennett Square, PA 19348, (800) 321-7816, www.metalwerksusa.com.
- B. Panel Depth: As indicated on Drawings.
- C. Aluminum Sheet: Tension-leveled, smooth aluminum sheet, ASTM B209, manufacturer's standard thickness for application.
 - 1. Exterior Finish: Two-coat fluoropolymer.
 - a. Color: As selected by Architect from manufacturer's full range.
- D. Attachment Assembly: Manufacturer's standard for application.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, 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.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

- E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer for application. Provide sealant types that are compatible with panel materials, are nonstaining, and do not damage panel finish.

2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements. Form panels true to shape, accurate in size, free from distortion or defects, in pieces of longest practical lengths to meet project design and requirements.
 - 1. Where indicated by project requirements, provide back-cuts on formed panel edges to maximize sharper bend and crisp panel edge appearance.
- B. 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. Utilize manufacturer's standard type gaskets, suitable for use with system, permanently resilient, and ultraviolet and ozone resistant.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

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

- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Aluminum Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions and approved shop drawings, in orientation, sizes, and locations indicated. Install panels perpendicular to

supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment. Use concealed fasteners unless otherwise indicated and approved by Architect.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
2. Use concealed fasteners unless otherwise indicated and approved by Architect.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Attachment Assembly, General: Install attachment assembly required to support metal plate wall panels and to provide a complete system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

E. Installation: Attach metal plate wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.

1. Rainscreen Systems: Do not apply sealants to joints unless otherwise indicated.
2. Fasten panels to substrate structural supports aligned, level, and plumb.
3. Locate joints over supports, and lap panel ends minimum 2 inches.
4. Provide expansion and control joints where required.
5. Seal and place gaskets to prevent weather penetration; maintain neat appearance.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended in writing by metal panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners

where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal plate wall panel units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/16-inch offset of adjoining faces and of alignment of matching profiles.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing agency to perform field tests and inspections.
- B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
- E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- D. Protect installed products from damage until Substantial Completion.

END OF SECTION 074213.16

SECTION 075423 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Adhered thermoplastic polyolefin (TPO) roofing system.
 - 2. Substrate board.
 - 3. Vapor retarder.
 - 4. Roof insulation.
 - 5. Cover board.
 - 6. Walkways.
- B. Section includes installation of sound-absorbing insulation strips in ribs of roof deck. Sound-absorbing insulation strips are furnished under Section 053100 "Steel Decking."
- C. Related Requirements:
 - 1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
 - 2. Section 061600 "Sheathing" for wood-based, structural-use roof deck panels.
 - 3. Section 072100 "Thermal Insulation" for insulation beneath the roof deck.
 - 4. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
 - 5. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
 - 6. Section 221423 "Storm Drainage Piping Specialties" for roof drains.
 - 7. DGS Procedure Manual for Professional Services, Roofing Standards, July 2015 or latest edition.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.
1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays. Schedule installation of roofing materials in warm weather for optimum conditions and handling of roof membrane and adhesion.
 4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
 5. Review structural loading limitations of roof deck during and after roofing.
 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
 7. Review governing regulations and requirements for insurance and certificates if applicable.
 8. Review temporary protection requirements for roofing system during and after installation.
 9. Review roof observation and repair procedures after roofing installation.
- B. Preinstallation Roofing Conference: Conduct conference at Project site.
1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 5. Review structural loading limitations of roof deck during and after roofing.
 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
 7. Review governing regulations and requirements for insurance and certificates if applicable.
 8. Review temporary protection requirements for roofing system during and after installation.
 9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.
- B. Sustainable Design Submittals:
 - 1. Product Test Reports: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirements.
 - 2. Product Data: For adhesives and sealants, indicating VOC content.
 - 3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
 - 4. Environmental Product Declaration: For each product.
 - 5. Health Product Declaration: For each product.
 - 6. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
- C. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
 - 1. Layout and thickness of insulation.
 - 2. Base flashings and membrane termination details.
 - 3. Flashing details at penetrations.
 - 4. Tapered insulation layout, thickness, and slopes.
 - 5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
 - 6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 - 7. Tie-in with adjoining air barrier.
- D. Samples for Verification: For the following products:
 - 1. Roof membrane and flashings, of color required.
 - 2. Walkway pads or rolls, of color required.
- E. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Manufacturer.
- B. Manufacturer Certificates:
 - 1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
 - 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

- C. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
- D. Evaluation Reports: For components of roofing system, from ICC-ES.
- E. Field Test Reports:
 - 1. Concrete internal relative humidity test reports.
 - 2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.
- F. Field quality-control reports.
- G. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed, and listed in FM Approvals' RoofNav for roofing system identical to that used for this Project.
 - 1. Provide a factory trained technician for participation in the pre-installation conference, with weekly site visits and a final inspection of the roofing system(s).
 - 2. Provide a warranty upon satisfactory installation of the roofing system.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty and meets requirements of the DGS Procedure Manual for Professional Services, Roofing Standards.
 - 1. Installer must have minimum 5 years' experience installing the project-specific type of roofing, be NDL certified roofing system installer for 5 years continuously minimum and concurrently.
- C. Source Limitations: Obtain components for membrane roofing system from roofing membrane manufacturer or manufacturer-approved sources.
- D. Fire-Test Response Characteristics: Where applicable, provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency for the project's roof installation type.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Schedule roof installation for warm weather to allow for optimum installation conditions and malleability of components. Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to material requirements and manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

- A. Special Warranty, General: Meet warranty requirements in current edition of DGS "Procedure Manual for Professional Services, Roofing Standards."
- B. Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, vapor retarder, substrate board, roof pavers, and other components of roofing system.
 - 2. Warranty Period: 20 years from date of Substantial Completion, for total system, No Dollar Limit (NDL) warranty and include all components of roofing system. All materials and workmanship are to be fully guaranteed by the roofing manufacturer issuing the warranty. All materials must be manufactured by the manufacturer who is to supply the warranty. Any materials that are not made by the Roofing Materials Manufacturer but submitted for approval must be accompanied by a letter from the Roofing Materials Manufacturer issuing the 20-year NDL warranty, stating that this material is suitable for use with their system and fully covered under their 20-year warranty.

3. Per DGS Procedure Manual for Professional Services Roofing Standards, Contractor to provide a current letter from a roofing materials manufacturer stating that the Installer is NDL certified and that their workmanship, including flashings and sheet-metal work related to roof will be fully covered by the manufacturer's 20-year NDL warranty without exception.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing system and flashings shall remain weathertight, do not permit the passage of water, withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.
 1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
 2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897 and able to resist the design uplift pressures calculated according to the applicable building codes and Authorities Having Jurisdiction.
 1. Field-of-Roof Design Uplift Pressure: 60 lbf/sq. ft. or as required by code, whichever is most stringent.
- D. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.
- E. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 64 for roofs with slopes of 2:12 or less, 32 for roofs with slopes greater than 2:12, or initial SRI not less than 82 for roofs with slopes of 2:12 or less, 39 for roofs with slopes greater than 2:12 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- F. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

- G. Exterior Fire-Test Exposure: ASTM E108 or UL 790, for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- H. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

- A. TPO Sheet: ASTM D6878/D6878M, uniform, flexible sheet, internally fabric- or scrim-reinforced, TPO sheet.
 - 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. Carlisle SynTec Incorporated.
 - b. Firestone Building Products.
 - c. Dow Roofing Systems.
 - d. Johns Manville; a Berkshire Hathaway company.
 - 2. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.
 - 3. Thickness: 60 mils, nominal.
 - 4. Exposed Face Color: As selected by Architect from Manufacturer's standard range.
 - 5. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
 - 1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.
 - 2. Adhesives and sealants shall comply with the following limits for VOC content:
 - a. Plastic Foam Adhesives: 50 g/L.
 - b. Gypsum Board and Panel Adhesives: 50 g/L.
 - c. Multipurpose Construction Adhesives: 70 g/L.
 - d. Fiberglass Adhesives: 80 g/L.
 - e. Contact Adhesives: 80 g/L.
 - f. PVC Welding Compounds: 510 g/L.
 - g. Other Adhesives: 250 g/L.
 - h. Single-Ply Roof Membrane Sealants: 450 g/L.
 - i. Nonmembrane Roof Sealants: 300 g/L.
 - j. Sealant Primers for Nonporous Substrates: 250 g/L.
 - k. Sealant Primers for Porous Substrates: 775 g/L.
 - 3. Adhesives and sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils thick, minimum, of same color as TPO sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- D. Roof Vents: As recommended by roof membrane manufacturer.
 - 1. Size: Not less than 4-inch diameter.
- E. Bonding Adhesive: Manufacturer's standard, water based.
- F. Slip Sheet: Manufacturer's standard, of thickness required for application.
- G. Vented Base Sheet: ASTM D4897/D4897M, Type II; nonperforated, asphalt-impregnated fiberglass reinforced, with mineral granular patterned surfacing on bottom surface.
- H. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- I. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.
- J. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- K. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.4 SUBSTRATE BOARDS

- A. Substrate Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M, fiber-reinforced gypsum board.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Georgia-Pacific Gypsum LLC (Basis of Design).
 - b. CertainTeed Corporation.
 - c. National Gypsum Company.
 - 2. Location and Thickness: As indicated in Drawings.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck and approved by manufacturer for application.

2.5 VAPOR RETARDER

- A. Polyethylene Film: ASTM D4397, 10 mils thick, minimum, with maximum permeance rating of 0.076 perm.
 - 1. Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.
 - 2. Adhesive: Manufacturer's standard lap adhesive, listed by FM Approvals for vapor retarder application.
- B. General: Provide vapor retarder suitable for application and compatible with roof assembly materials.
- C. Self-Adhering-Sheet Vapor Retarder: ASTM D1970/D1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40-mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.

2.6 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by TPO roof membrane manufacturer, approved for use in FM Approvals' RoofNav listed roof assemblies, approved for use in SPRI's Directory of Roof Assemblies listed roof assemblies.
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 3, felt or glass-fiber mat facer on both major surfaces.
 - 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. Carlisle SynTec Incorporated.
 - b. Firestone Building Products.
 - c. Hunter Panels.
 - d. Johns Manville; a Berkshire Hathaway company.
 - 2. Compressive Strength: 25 psi minimum.
 - 3. Size: 48 by 96 inches.
 - 4. Thickness: As indicated on Drawings and to meet project requirements,
 - 5. Tapered for slope as indicated on Drawings and to meet project requirements.

2.7 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.
- B. Fasteners: Factory-coated steel fasteners with metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer. Utilize the fasteners from the same manufacturer throughout the project.

- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
1. Adhesives and sealants shall comply with the following limits for VOC content:
 - a. Plastic Foam Adhesives: 50 g/L.
 - b. Gypsum Board and Panel Adhesives: 50 g/L.
 - c. Multipurpose Construction Adhesives: 70 g/L.
 - d. Fiberglass Adhesives: 80 g/L.
 - e. Contact Adhesives: 80 g/L.
 - f. PVC Welding Compounds: 510 g/L.
 - g. Other Adhesives: 250 g/L.
 - h. Single-Ply Roof Membrane Sealants: 450 g/L.
 - i. Nonmembrane Roof Sealants: 300 g/L.
 - j. Sealant Primers for Nonporous Substrates: 250 g/L.
 - k. Sealant Primers for Porous Substrates: 775 g/L.
 2. Adhesives and sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M fiber-reinforced gypsum board.
1. Manufacturer and Product: Subject to project requirements, utilize same manufacturer as Substrate Board.
 2. Thickness: As indicated in Drawings.

2.8 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.
1. Size: Approximately 36 by 60 inches unless indicated otherwise.
 2. Color: Contrasting with roof membrane.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."

4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 5. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than that recommended by roofing system manufacturer, when tested according to ASTM F2170.
 - a. Test Frequency: One test probe per each 1000 sq. ft., or portion thereof, of roof deck, with not less than three tests probes.
 - b. Submit test reports within 24 hours after performing tests.
 6. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
 7. Verify that joints in precast concrete roof decks have been grouted flush with top of concrete.
 8. Verify that minimum curing period recommended by roofing system manufacturer for lightweight insulating concrete roof decks has passed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
 1. Submit test result within 24 hours after performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.
- D. Install sound-absorbing insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav, SPRI's Directory of Roof Assemblies listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- 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. Where applicable, install roof membrane and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

3.4 INSTALLATION OF SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.
 - 1. At steel roof decks, install substrate board at right angle to flutes of deck.
 - a. Locate end joints over crests of steel roof deck.
 - 2. Tightly butt substrate boards together.
 - 3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - 4. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.5 INSTALLATION OF VAPOR RETARDER

- A. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 and 6 inches, respectively.
 - 1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
 - 2. Continuously seal side and end laps with adhesive.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.6 INSTALLATION OF INSULATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.
- B. Comply with roofing system and roof insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Metal Decking:
 - 1. Install base layer of insulation with end joints staggered not less than 12 inches in adjacent rows and with long joints continuous at right angle to flutes of decking.
 - a. Locate end joints over crests of decking.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

- 1) Trim insulation so that water flow is unrestricted.
 - e. Fill gaps exceeding 1/4 inch with insulation.
 - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - g. Mechanically attach base layer of insulation and substrate board using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.
 - 1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.
2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.
 - a. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - e. Fill gaps exceeding 1/4 inch with insulation.
 - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - g. Loosely lay each layer of insulation units over substrate.
 - h. Adhere each layer of insulation to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - 1) Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

D. Installation Over Lightweight Insulating Concrete Decks:

1. Mechanically fasten vented base sheet to lightweight insulating concrete, with vented side down, using mechanical fasteners specifically designed and sized for fastening to lightweight insulating concrete decks.
 - a. Fasten vented base sheet to resist specified uplift pressure at corners, perimeter, and field of roof.
2. Install base layer of insulation with end joints staggered not less than 12 inches in adjacent rows.
 - a. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - b. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - c. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - d. Fill gaps exceeding 1/4 inch with insulation.
 - e. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - f. Loosely lay base layer of insulation units over substrate.

3. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.
 - a. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - e. Fill gaps exceeding 1/4 inch with insulation.
 - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - g. Loosely lay each layer of insulation units over substrate.

3.7 INSTALLATION OF COVER BOARDS

- A. Install cover boards per roofing manufacturer's written instructions.
- B. 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 in each direction.
 1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 2. At internal roof drains, conform to slope of drain sump.
 - a. Trim cover board so that water flow is unrestricted.
 3. Cut and fit cover board tight to nailers, projections, and penetrations.
 4. Adhere cover board to substrate using adhesive according to SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
- C. Install slip sheet over cover board and beneath roof membrane.

3.8 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- D. Accurately align roof membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

- E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- F. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer and install fabric-backed roof membrane.
- G. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- H. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- I. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, 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 roof membrane and sheet flashings.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- J. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.9 INSTALLATION OF BASE FLASHING

- 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.

3.10 INSTALLATION OF WALKWAYS

- A. Flexible Walkways:
 - 1. Install flexible walkways at the following locations:
 - a. Where indicated on Drawings.
 - b. Perimeter of each rooftop unit.

- c. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
 - d. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
 - e. Top and bottom of each roof access ladder.
 - f. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
 - g. Locations indicated on Drawings.
 - h. As required by roof membrane manufacturer's warranty requirements.
2. Provide 6-inch clearance between adjoining pads.
 3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.
- C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.12 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 system, inspect roofing system 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 075423

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Formed roof-drainage sheet metal fabrications.
 - 2. Formed low-slope roof sheet metal fabrications.
 - 3. Formed wall sheet metal fabrications.
 - 4. Formed equipment support flashing.
- B. Related Requirements:
 - 1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
 - 3. Refer to Drawings for Sheet Metal Flashing and Trim locations, sizes, profiles, and relationship with other construction elements.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each of the following
 - 1. Underlayment materials.
 - 2. Elastomeric sealant.
 - 3. Butyl sealant.
 - 4. Epoxy seam sealer.
- B. Shop Drawings: For sheet metal flashing and trim.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.

3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.

- C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For copings and roof edge flashing, from an agency acceptable to authority having jurisdiction showing compliance with ANSI/SPRI/FM 4435/ES-1.
- D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
- B. Special warranty.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockup of typical roof edge, including built-in gutter, fascia, fascia trim, approximately 10 feet long unless indicated otherwise, including supporting construction cleats, seams, attachments, underlayment, and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
 1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 2. Protect stored sheet metal flashing and trim from contact with water.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, 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: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
 1. Design Pressure: As indicated on Drawings.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent 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: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
1. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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.
 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.
- C. Stainless Steel Sheet: ASTM A240/A240M, Type 304, dead soft, fully annealed; with smooth, flat surface.
1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled), ASTM A480/A480M, No. 3 (coarse, polished directional satin), ASTM A480/A480M, No. 4 (polished directional satin), or as selected by Architect.
 - a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1) Run grain of directional finishes with long dimension of each piece.
 - 2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- D. Metallic-Coated Steel Sheet: Provide aluminum-zinc alloy-coated steel sheet in accordance with ASTM A792/A792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A755/A755M.
1. Surface: Smooth, flat.
 2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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.
 3. Color: Match Architect's sample.
 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.
- E. Zinc Sheet: 99.995 percent electrolytic high-grade zinc with alloy additives of copper (0.08 to 0.20 percent), titanium (0.07 to 0.12 percent), and aluminum (0.015 percent); with manufacturer's standard factory-applied, flexible, protective back coating.
1. Source Limitations: Obtain sheet from single source from single manufacturer.
 2. Finish: To be selected by Architect..

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F; and complying with physical requirements of ASTM D226/D226M for Type I and Type II felts.
 - 1. Source Limitations: Obtain underlayment from single source from single manufacturer.
- C. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
 - 1. Source Limitations: Obtain underlayment from single source from single manufacturer.
 - 2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.
- D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
 - 4. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

- D. Elastomeric Sealant: ASTM C920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.
- H. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.
- I. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.
 - 1. Source Limitations: Obtain reglets from single source from single manufacturer.
 - 2. Material: Aluminum, 0.024 inch thick.
 - 3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 - 4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
 - 5. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
 - 6. Finish: With manufacturer's standard color coating as selected and approved by Architect.

2.5 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
 - 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
 - 4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.

5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances:
 1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. 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.
- G. Seams:
 1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- H. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters:
 1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
 2. Fabricate in minimum 96-inch- long sections.
 3. Furnish flat-stock gutter brackets and flat-stock 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.
 4. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
 5. Gutter Profile: As indicated in Drawings and in accordance with cited sheet metal standard.
 6. Expansion Joints: Butt type with cover plate unless indicated otherwise.

7. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen.
 8. Gutters with Girth up to 15 Inches: Fabricate from one of the following materials to match downspouts:
 - a. Aluminum: 0.032 inch thick.
 - b. Stainless Steel: 0.016 inch thick.
 - c. Galvanized Steel: 0.022 inch thick.
 - d. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.
 - e. Zinc: 0.039 inch thick.
 9. Gutters with Girth 16 to 20 Inches: Fabricate from the following materials:
 - a. Aluminum: 0.040 inch thick.
 - b. Stainless Steel: 0.019 inch thick.
 - c. Galvanized Steel: 0.028 inch thick.
 - d. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
 - e. Zinc: 0.039 inch thick.
 - f.
- B. Built-in Gutters:
1. Fabricate to cross section required, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required.
 2. Fabricate in minimum 96-inch- long sections. Fabricate expansion joints and accessories from same metal as gutters unless otherwise indicated.
 3. Fabricate gutters with built-in expansion joints and gutter-end expansion joints at walls.
 4. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen.
 5. Fabricate from one of the following materials:
 - a. Stainless Steel: 0.016 inch thick.
 - b. Zinc: 0.032 inch thick.
- C. Downspouts: Fabricate downspouts to shape and dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.
1. Fabricate from the following materials to match gutters:
 - a. Aluminum: 0.024 inch thick.
- D. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:
1. Aluminum: 0.032 inch thick.
 2. Stainless Steel: 0.019 inch thick.
 3. Galvanized Steel: 0.028 inch thick.
 4. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
 5. Zinc: 0.039 inch thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop): Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long sections. Furnish with 6-inch- wide, joint cover plates. Shop fabricate interior and exterior corners.
1. Joint Style: Overlapped, 4 inches wide.
 2. Fabricate with scuppers spaced as indicated in Drawings, to dimensions required with 4-inch- wide flanges and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
 3. Fabricate from material to match fascia as approved by Architect.
- B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- 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. Coping Profile: As indicated in Drawings and in accordance with SMACNA's "Architectural Sheet Metal Manual."
 2. Joint Style: Butted with expansion space and 6-inch- wide, concealed backup plate.
 3. Fabricate from material to match fascia as approved by Architect.
- C. Expansion-Joint Cover: Fabricate from the following materials to meet project requirements:
1. Aluminum: 0.050 inch thick.
 2. Stainless Steel: 0.025 inch thick.
 3. Galvanized Steel: 0.034 inch thick.
 4. Aluminum-Zinc Alloy-Coated Steel: 0.034 inch thick.
 5. Zinc: 0.032 inch thick.
- D. Flashing, Counterflashing and Flashing Receivers: Fabricate from the following materials to meet project requirements:
1. Aluminum: 0.040 inch thick.
 2. Stainless Steel: 0.019 inch thick.
 3. Galvanized Steel: 0.028 inch thick.
 4. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
 5. Zinc: 0.032 inch thick.

2.8 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials, unless indicated otherwise:
1. Stainless Steel: 0.016 inch thick.
- B. Wall Expansion-Joint Cover: Fabricate from the following materials unless indicated otherwise:
1. Aluminum: 0.040 inch thick.
 2. Stainless Steel: 0.019 inch thick.
 3. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

2.9 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.019 inch thick.
 2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim.
1. Install in shingle fashion to shed water.
 2. Lap joints not less than 2 inches.
- B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, in accordance with manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
1. Lap horizontal joints not less than 4 inches.
 2. Lap end joints not less than 12 inches.
- C. Self-Adhering, High-Temperature Sheet Underlayment:
1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
 2. Prime substrate if recommended by underlayment manufacturer.
 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
 5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
 6. Roll laps and edges with roller.
 7. Cover underlayment within 14 days.
- D. If required, install slip sheet, wrinkle free, before installing sheet metal flashing and trim.
1. Install in shingle fashion to shed water.

2. Lapp joints not less than 4 inches.

3.3 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
 1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
 5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
 6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 8. Do not field cut sheet metal flashing and trim by torch.
 9. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
 1. Space movement joints at spacing approved by Architect, but at maximum of 10 feet with no joints within 24 inches of corner or intersection.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
 1. Use sealant-filled joints unless otherwise indicated.
 - a. Form joints to completely conceal sealant.
 - b. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.

- c. Adjust setting proportionately for installation at higher ambient temperatures.
 - 1) Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.4 INSTALLATION OF ROOF-DRAINAGE SYSTEM

- A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters:
 1. Join sections with joints sealed with sealant.
 2. Provide for thermal expansion.
 3. Attach gutters where indicated at eave or fascia to firmly anchor them in position.
 4. Provide end closures and seal watertight with sealant.
 5. Slope to downspouts.
 6. Fasten gutter spacers to front and back of gutter.
 7. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
 8. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
 9. Anchor gutter with gutter brackets spaced not more than 24 inches apart to roof deck unless otherwise indicated, and loosely lock to front gutter bead.
 10. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, 50 feet apart. Install expansion-joint caps.
 11. Install continuous gutter screens on gutters with noncorrosive fasteners, hinged to swing open for cleaning gutters.
- C. Built-in Gutters:
 1. Join sections with joints sealed with sealant.
 2. Provide for thermal expansion.
 3. Slope to downspouts.
 4. Provide end closures and seal watertight with sealant.
 5. Install underlayment layer in built-in gutter trough as indicated in Drawings and extend to drip edge at eaves and under underlayment on roof sheathing.
 - a. Lap sides minimum of 2 inches over underlying course.
 - b. Lap ends minimum of 4 inches.
 - c. Stagger end laps between succeeding courses at least 72 inches.
 - d. Fasten with roofing nails.
 - e. Install slip sheet over underlayment.
 6. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 18 inches apart.
 7. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, 50 feet apart. Install expansion-joint caps.
- D. Downspouts:
 1. Join sections with 1-1/2-inch telescoping joints.
 2. Provide hangers with fasteners designed to hold downspouts securely to walls.

3. Locate hangers at top and bottom and at approximately 60 inches o.c.

E. Parapet Scuppers:

1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
2. Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
3. Loosely lock front edge of scupper with conductor head.
4. Seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.

- F. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated on Drawings. Lap joints minimum of 4 inches in direction of water flow.

3.5 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.

C. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.

- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches over base flashing.
3. Lap counterflashing joints minimum of 4 inches.
4. Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant unless otherwise indicated.

- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal and clamp flashing to pipes that penetrate roof.

3.6 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.7 INSTALLATION OF MISCELLANEOUS FLASHING

- A. Equipment Support Flashing:
 - 1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
 - 2. Seal flashing with elastomeric sealant to equipment support member.

3.8 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.9 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

3.10 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment supports.
 - 2. Roof hatches.
 - 3. Pipe and duct supports.
 - 4. Roof fall arrest anchors.
- B. Related Sections:
 - 1. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
 - 2. Section 077237 "Acoustically Rated Smoke and Heat Vents."
 - 3. Section 055000 "Metal Fabrications" for roof ladders.
 - 4. Division 07 Sections for roofing system requirements.
 - 5. Division 22 and 23 Sections for additional roof accessories for mechanical and plumbing equipment and infrastructure.

1.3 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
 1. Size and location of roof accessories specified in this Section or on Drawings.
 2. Method of attaching roof accessories to roof or building structure.
 3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
 4. Required clearances.
- B. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Wind-Restraint Performance: As indicated on Drawings and to meet requirements of Authority Having Jurisdiction.

2.2 EQUIPMENT SUPPORTS

- A. Equipment Supports: 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 or mechanically fastened and sealed corner joints, integral metal cant, or stepped integral metal cant raised the thickness of roof insulation, and integrally formed structure-mounting flange at bottom.

- B. Size: Coordinate dimensions and required load capacity with roughing-in information or Shop Drawings of equipment to be supported.
- C. Material: Aluminum-zinc alloy-coated steel sheet, thickness required for project requirements.
 - 1. Finish: Baked enamel or powder coat .
 - 2. Color: As selected by Architect from manufacturer's full range.
- D. Construction:
 - 1. Curb Profile: Manufacturer's standard compatible with roofing system.
 - 2. Insulation: Factory insulated with manufacturer's standard thickness 1-1/2-inch- glass-fiber board insulation for application.
 - 3. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
 - 4. Nailer: Factory-installed continuous wood nailers, continuous around support perimeter.
 - 5. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb of size and spacing required to meet wind uplift requirements.
 - 6. Platform Cap: Where portion of equipment support is not covered by equipment, provide weathertight platform cap formed from 3/4-inch thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
 - 7. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
 - 8. Fabricate equipment supports to minimum height of 6 inches above roofing surface unless otherwise indicated.
 - 9. 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.

2.3 ROOF HATCH

- A. Roof Hatches: Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, straight sides, integral metal cant where required, and integrally formed deck-mounting flange at perimeter bottom.
- B. 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. Babcock-Davis.
 - 2. Bilco Company (The).
 - 3. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - 4. Lexcor; a division of Luxsuo corp.
 - 5. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - 6. Nystrom, Inc.
- C. Type and Size: Single-leaf lid, as indicated in Drawings.
- D. STC Rating: STC45.

- E. Loads: Meet code requirements. Refer to Drawings for criteria.
- F. Hatch Material: Aluminum sheet.
 - 1. Thickness: Manufacturer's standard thickness for hatch size indicated.
 - 2. Finish: Two-coat fluoropolymer or Baked Enamel or Powder Coat.
 - 3. Color: As selected by Architect from manufacturer's full range.
- G. Construction:
 - 1. Insulation: Manufacturer's standard, thickness as required for application.
 - 2. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
 - 3. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
 - 4. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
 - 5. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
 - 6. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
 - 7. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is constant. Equip hatch with water diverter or cricket on side that obstructs water flow.
- H. Hardware: Spring operators, hold-open arm, stainless-steel spring latch with turn handles, stainless-steel butt- or pintle-type hinge system, and padlock hasps inside and outside.
 - 1. Provide two-point latch on lids larger than 84 inches.
 - 2. Provide remote-control operation.
- I. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.
 - 1. Height: 42 inches above finished roof deck.
 - 2. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches in diameter or galvanized-steel tube, 1-5/8 inches in diameter.
 - 3. Flat Bar: Galvanized steel, 2 inches high by 3/8 inch thick.
 - 4. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches in diameter.
 - 5. Chain Passway Barrier: Galvanized proof coil chain with quick link on fixed end.
 - 6. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
 - 7. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
 - 8. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
 - 9. Fabricate joints exposed to weather to be watertight.
 - 10. Fasteners: Manufacturer's standard, finished to match railing system.
 - 11. Finish: Manufacturer's standard baked enamel or powder coat.
 - a. Color: As selected by Architect from manufacturer's full range.

- J. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.
 - 1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
 - 2. Height: 42 inches above finished roof deck.
 - 3. Material: Aluminum.
 - 4. Post: 1-5/8-inch- diameter pipe.
 - 5. Finish: Manufacturer's standard baked enamel or powder coat.
 - a. Color: As selected by Architect from manufacturer's full range.

2.4 PIPE AND DUCT SUPPORTS

- A. Adjustable-Height Structure-Mounted Pipe Supports: Extruded-aluminum tube, filled with urethane insulation; 2 inches in diameter or as required for project installation; accommodating up to 7-inch- diameter pipe or conduit, with provision for pipe retainer; with aluminum baseplate, EPDM base seal, manufacturer's recommended hardware for mounting to structure or structural roof deck as indicated, stainless-steel roller and retainer, and extruded-aluminum carrier assemblies; as required for quantity of pipe runs and sizes.
- B. Duct Supports: Extruded-aluminum, urethane-insulated supports, 2 inches in diameter, or as required for project installation; with manufacturer's recommended hardware for mounting to structure or structural roof deck.
 - 1. Finish: Manufacturer's standard.

2.5 PIPE PORTALS

- A. Flashing Pipe Portal: Formed aluminum membrane-mounting flashing flange and sleeve with collared opening and pressure-sealed conically shaped EPDM protective rubber cap sized for piping indicated, with stainless-steel snaplock swivel clamps.

2.6 ROOF FALL ARREST ANCHORS

- A. Roof Fall Arrest Anchors: Provide and install beam wrap roof anchor fall arrest anchors as required for installation and to meet requirements of Authorities Having Jurisdiction. Quantity and placement indicated in Drawings is indicated for pricing purposes only. Provide Delegated Design services to determine final quantity and placement.
- B. Basis of Design: BWRA.1010.24, 24 inch height, working load 1250 lb, manufactured by American Anchor, 71 Elm Street, Suite 3, Foxboro, MA 02035, phone 800.371.8221.

2.7 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.
 - 1. Mill-Phosphatized Finish: Manufacturer's standard.

2. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.
 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.
- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 coated.
1. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.
 2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.
- C. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
1. Mill Finish: As manufactured.
 2. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.
- D. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.
- E. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.
- F. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.
- G. Steel Tube: ASTM A 500/A 500M, round tube.
- H. Galvanized-Steel Tube: ASTM A 500/A 500M, round tube, hot-dip galvanized according to ASTM A 123/A 123M.
- I. Steel Pipe: ASTM A 53/A 53M, galvanized.
- 2.8 MISCELLANEOUS MATERIALS
- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
 - B. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, thickness as indicated.

- C. Glass-Fiber Board Insulation: ASTM C 726, nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.
- D. Polyisocyanurate Board Insulation: ASTM C 1289, thickness and thermal resistivity as indicated.
- E. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.
- F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- G. Underlayment:
 - 1. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 - 2. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.
 - 3. Slip Sheet: Building paper, 3 lb/100 sq. ft. minimum, rosin sized.
 - 4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 5. 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:
 - 6. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
 - 7. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 8. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- H. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- I. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- J. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- K. Asphalt Roofing Cement: ASTM D 4586/D 4586M, asbestos free, of consistency required for application.

2.9 GENERAL FINISH REQUIREMENTS

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

- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: 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 roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.
- D. Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.

1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
- E. Preformed Flashing-Sleeve and Flashing Pipe Portal Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions; flash sleeve flange to surrounding roof membrane according to roof membrane manufacturer's instructions.
- F. Roof-Hatch Installation:
 1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
 2. Attach safety railing system to roof-hatch curb.
 3. Attach ladder-assist post according to manufacturer's written instructions.
- G. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.
- H. Roof Fall Arrest Anchor Installation: Install per Manufacturer's instructions for application to meet project requirements and requirements of Authorities Having Jurisdiction.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780/A 780M.
- B. Clean exposed surfaces according to manufacturer's written instructions.
- C. Clean off excess sealants.
- 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 077237 – ACOUSTICALLY RATED SMOKE AND HEAT VENTS

PART 1 - GENERAL

1. RELATED DOCUMENTS

- A. Drawings and Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Provide acoustically rated smoke and heat vent assemblies as specified herein and as shown on the Drawings. Furnish as complete assemblies for installation by field personnel licensed by the manufacturer.

1.3 RELATED SECTIONS

- A. Division 07 – Roofing.
- B. Division 07 – Roof Accessories.
- C. Division 07 – Joint Sealants.
- D. Division 09 – Painting.
- E. Division 23 – Heating, Ventilating and Air Conditioning.
- F. Division 26 – Electrical.

1.4 REFERENCES

- A. American Society for Testing and Materials:
 - 1. E90-97 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss through Building Partitions.
 - 2. E336-97 – Standard Test Method for Measurement of Airborne Sound Insulation in Buildings
 - 3. E413-87 – Classification for Rating Sound Insulation

1.5 SYSTEM PERFORMANCE REQUIREMENTS

- A. Comply with applicable federal, state, and local codes. The stage ventilation provisions and the smoke control provisions of NFPA 101, 12.4.6.5 and 12.4.6.5.1 shall be met.

- B. Test smoke and heat vent assemblies in accordance with ASTM E90 for classification under ASTM E413 to ratings required by the Construction Documents.
- C. Provide assemblies with minimum ratings of STC 45 and OITC 37.
- D. Loads: Fabricate vent assemblies to withstand a minimum 40 psf external live load with a maximum deflection of 1/150 of the span and designed to hold covers closed against a 105 psf wind uplift.
- E. When release is actuated, cover shall open against 10 psf snow or wind load and lock in position.
- F. Fire resistance of Covers: Where fire-resistance classification is indicated, provide fire rated units listed by Underwriters Laboratories, Inc., Factory Mutual Research Corporation (FMRC), or both.
- G. The roof vents shall provide a net free vent area equal to 5 percent of the stage area. A supplemental means of manual activation shall be provided, per NFPA 101, 12.6.4.5.2.

1.6 QUALITY ASSURANCE

- A. Single-Source Responsibility: Supply acoustically rated smoke and heat vent assemblies from a single manufacturer with minimum experience of 10 years in fabricating similar assemblies.
- B. Install assemblies with manufacturer's own personnel or with installers trained and licensed by the manufacturer. In the latter case, provide manufacturer's field representative to oversee the installation of the vents.
- C. Acceptance Testing: Following installation and adjustment of gaskets, perform Noise Reduction measurements on all acoustically rated smoke and heat vent assemblies to demonstrate that the specified performance standards have been met or exceeded. An independent, qualified laboratory or acoustics consultant shall perform these tests. The costs for these measurements shall be the responsibility of the contractor. The contractor shall submit the results of the tests to the Owner prior to final acceptance.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect vent assemblies from weather and from damage during shipping and storage. Follow manufacturer's recommendations for protection and prevention of wracking and damage to curbs, covers, hardware, and seals.
- B. Inspect vents upon delivery for damage and defects. Superficial damage may be repaired to the Owner's acceptance. Replace units that are found to be distorted.

1.8 SUBMITTALS

- A. Submit manufacturer's data, shop drawings, and product performance certifications in accordance with Division 01 requirements.
- B. Manufacturer's Data: Submit technical product data confirming that products comply with specified requirements:
 - 1. Illustrations and descriptions of components including, but not limited to curbs, covers, seals, hardware, and anchors.
 - 2. Operation and maintenance instructions.
- C. Shop Drawings
 - 1. 1:48 scale plans indicating dimensioned locations and sizes of vent assemblies.
 - 2. Quarter-size details of vent assemblies indicating curbs, covers, seals, anchors, interface with roofing and flashings, and material finishes.
 - 3. Substrate construction required of other subcontractors.
 - 4. Schedule of vent assemblies with reference numbers that match or are cross-referenced to those indicated on the Drawings.
- D. Samples: 4-inch square samples of all finishes.
- E. Certifications: Provide the following:
 - 1. Certified laboratory test reports from an independent acoustics testing laboratory demonstrating compliance of an operating vent assembly with ASTM E90-97 for the specified STC rating. Test data may not be more than 5 years old.
 - 2. Written reports of at least two separate field tests of installed vent assemblies demonstrating that comparable installations have met or exceeded Noise Isolation Class (NIC) 40. NIC testing must comply with ASTM E336-97 test methods.
 - 3. Supervision plan for manufacturer's representative in the field during installation.

1.9 WARRANTY

- A. Warrant acoustically rated smoke and heat vents, including interfaces with roofing and flashing materials, against defects in materials and workmanship for five years from Final Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis of Design: Subject to compliance with requirements, provide BSVG- Steel Acoustical Smoke Vent – STC45, manufactured by Babcock-Davis as Basis of Design product.
- B. Additional Manufacturers: Subject to compliance with requirements, additional manufacturers who may provide a comparable product include, but are not limited to:
 - 1. Nystrom, Inc.

2. Bilco Company (The)

2.2 MANUFACTURED UNITS

- A. Galvanized Steel Acoustic Smoke Vents: Manufacturer's standard acoustically rated hatch-type heat and smoke vents with upward opening leaves, STC Rating 45 and OITC Rating 37.
1. Cover and Liner: 14 gauge galvanized sheet steel cover with 3 inch thick acoustic insulation and 12 gauge galvanized steel cover liner ASTM A653/A653M.
 2. Curb: 12 gauge galvanized steel inner curb, 14 gauge galvanized steel outer curb. Manufacturer's standard curb height 13", with 9" usable, unless otherwise indicated.
 3. Hinge: Zinc plated steel tamper proof hinge contained within hatch as part of spring assembly.
 4. Latch: Manual winch with tandem zinc plated pyrolatches with inside and outside release handle and an automatic release mechanism assisted with 165 degree F thermal melt-out fusible links.
 5. Springs: High pressure gas springs enclosed in telescoping tubes, designed to open covers automatically against 10 pounds per square foot wind or snow load when released.
 6. Hardware: Zinc plated steel, manufacturer's standard for complete installation.
 7. Gaskets: Extruded EPDM rubber acoustic draft seal permanently adhered to the upward opening covers.
 8. Mounting Flange: 4.75"
 9. Insulation: Fiberglass acoustic insulation, 3 inch thick in cover and minimum 1.75 inch on curb perimeter.
- B. Finish: Manufacturer's standard factory-applied powder coat paint.

2.3 FABRICATION

- A. Hatch-Type Heat and Smoke Vents: Provide integral double-wall insulated curbs and frame, with welded or sealed mechanical corner joints, integral condensation gutter, and cap flashing. Fabricate with insulated double-wall lid and continuous weathertight perimeter lid gaskets. Equip with automatic self-lifting mechanisms, UL-listed fusible links rated at 165 deg F and corrosion-resistant or hot-dip galvanized hardware including hinges, hold-open devices, and independent manual-release devices for inside and outside operation of lids.
- B. Operation: Provide units with compression springs enclosed in telescopic tubes to open covers automatically against specified snow/wind load when released. Provide each cover with a shock absorber to control rate of opening and hold-open arms to lock cover in open position.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before commencing installation examine the substrate and surrounding conditions to insure that there is nothing to prevent proper and timely execution of the installation. Beginning work specified in this Section shall indicate acceptance of the substrate and surrounding conditions.

3.2 INSTALLATION

- A. General: Install acoustical smoke vents according to manufacturer's written instructions. Coordinate installation of acoustical smoke vents with installation of roof deck, roof structure, roofing membrane and base flashing.
- B. Anchor securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing installation. Install to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.
- C. Install vent assemblies level, plumb, true to line and elevation, without warping, jogs in alignment, oil-canning, buckling, or tool marks.
- D. Install to fit substrates and to result in watertight performance.
- E. 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 manufacturer.
 - 1. Coat concealed side of mounting flanges with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.

3.3 CLEANING AND ADJUSTMENT

- A. Provide final adjustment of covers, hardware, and seals just prior to acceptance testing.

END OF SECTION 077237

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes firestopping systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Acceptable Manufacturers: Firestop systems produced by the following manufacturers will be acceptable, subject to review by Owner. For each type of firestop system used throughout the Work, provide only firestop materials made or recommended by a single manufacturer.
 - 1. Hilti Construction Chemicals, Inc.
 - 2. Isolatek International
 - 3. Minnesota Mining & Mfg. Co. (3M)
 - 4. Specified Technologies Inc.
 - 5. Tremco Inc.

6. United States Gypsum Co.
 7. DAP Inc.
- C. Firestop Systems: Provide only firestop systems which have been tested and listed as firestop systems to meet every condition in the Work. Do not provide materials or systems not part of a tested firestop system suitable for the condition or not certified by manufacturer as an engineered deviation suitable for the condition as approved by manufacturer's qualified Fire Protection Engineer. Use of an engineered deviation from a manufacturer shall not be permitted if a tested and rated firestop system from another manufacturer exists for the condition.
1. Contractor's selection of firestop systems shall be suitable for the field conditions, based on the actual size, location and materials used in the Work
- C. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- D. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required, including but not limited to, temporary or permanent damming, backing or forming materials, fillers, mechanical fastenings, support devices, collars, sleeves, cleaners, primers, and other materials. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
- G. Sealant: Sealant shall have a VOC content of 250 g/L or less.

2.3 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspections:
 - 1. Firestopping materials shall be inspected by the manufacturers' technical representative as required to assure proper mixing and application.
 - 2. Prior to concealing and enclosing an area containing firestopping, Contractor shall notify the inspection agency and also arrange for inspections by authorities having jurisdiction.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out

and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Joints in or between fire-resistance-rated constructions.
 - 2. Joints at exterior curtain-wall/floor intersections.
- B. Related Requirements:
 - 1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies and for wall identification.
 - 2. Section 079500 "Expansion Control" for fire-resistive architectural joint systems.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- C. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
 - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."

JOINT FIRESTOPPING

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2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. A/D Fire Protection Systems Inc.
 - c. Hilti, Inc.
 - d. RectorSeal.
 - e. Roxul Inc.
 - f. Specified Technologies, Inc.
 - g. Thermafiber, Inc.; an Owens Corning company.
 - h. Tremco, Inc.
 - 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
 - 1. Sealant shall have a VOC content of 250 g/L or less.
 - 2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
 - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.

3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 CLEANING AND PROTECTION

- A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 078443

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Polyurethane joint sealants.
 - 2. Acrylic-Latex joint sealants.
 - 3. Silicone joint sealants.
 - 4. Acoustical sealants.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for sealants.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Material Use Certificates: Submit certificates from manufacturers of joint sealants attesting that their products comply with Specification requirements and are suitable for the use indicated.
- E. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.4 QUALITY ASSURANCE

- A. **Installer Qualifications:** Engage an experienced Installer who has completed joint sealant applications similar in material, design, and extent to that indicated for this Project that have resulted in construction with a record of successful in-service performance.
- B. **Source Limitations:** Obtain each kind of joint sealant from single source from single manufacturer.
- C. **Product Testing:** Provide comprehensive test data for each type of joint sealant based on tests conducted by a qualified independent testing laboratory on current product formulations within a 24-month period preceding date of Contractor's submittal of test results to Architect.
 - 1. Test elastomeric sealants for compliance with requirements specified by reference to ASTM C 920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), low-temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.

1.5 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. **General Requirements**
 - 1. **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 joint-sealant manufacturer, based on testing and field experience.
 - 2. **Colors:** Color of exposed joint sealants to match materials to be sealed. Custom colors shall be used when standard colors do not meet Project design as acceptable to Architect.
 - 3. Where exposed to foot traffic, sealant shall be nontracking material of sufficient strength and hardener to withstand stiletto heel traffic without damage or deterioration of sealer system.
- B. **VOC Content of Interior Sealants:**
 - 1. Refer to Section 018133.14 "Sustainable Design Requirements – LEED V4 BD+C" for sustainable design requirements.

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2. Architectural sealants shall have a VOC content of 250 g/L or less.
 3. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
 4. Sealants and sealant primers for porous substrates shall have a VOC content of 775 g/L or less.
 5. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - 6.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

2.2 SEALANT TYPES

- A. Sealant Type 1: (Two Part) Polyurethane: Two-Component polyurethane polymer with Shore A hardness of 35 (plus or minus 10), non-staining, and confirming to FS TT-S-00227, Type I (self-leveling) and Type II (non-sag), Class A. Sealant shall be free of oxidation, shall maintain resilience, and have service range of -40 degrees F and -18 degrees F when tested as per ASTM D2240-81. Cured physical properties shall comply with ANSI A116.1, Class B, suitable for foot-traffic joints with joint movement of 15% which are not bituminous contaminated.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Sonneborn-Contech; Sonolastic Paving Joint Sealant, Sonlastic NP2
 - b. Vulken: Vulken 227 (non-sag) and Vulken 245 (self-leveling)
- B. Sealant Type 2: Siliconized Acrylic-Latex Compound: Non-staining, non-bleeding, non-cracking, one-part acrylic-emulsion-polymer based compound for use in narrow interior openings.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Sonneborn-Contech; Sonolac
 - b. Pecora Chemical Corporation: Acrylic Latex Calk AC-20
- C. Sealant Type 3: (One Part) Silicone: Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 799.
 - b. May National Associates, Inc.; Bondaflex Sil 200 GPN.
 - c. Polymeric Systems, Inc.; PSI-631.
 - d. Schnee-Morehead, Inc.; SM5731 Poly-Glaze Plus.
 - e. Tremco Incorporated; Tremsil 600.
- D. Sealant Type 4: Acoustical Sealant: Non drying, nonhardening, non skinning, nonstaining, gunnable, synthetic rubber sealant.

1. Products: The following products are acceptable for non fire-rated partitions:
 - a. Acoustical Sealant; U.S. Gypsum.
 - b. Acoustical Sealant; Tremco Inc.
 - c. BA-97, BA-98 Acoustical Sealant; Pecora Corporation.
 - d. Acoustical Sealant 808; Protective Treatments, Inc
 - e. Acoustical Caulking CC-75; Mason Industries, Inc.
2. Products: The following products are acceptable for fire-rated partitions:
 - a. CP 25 Caulk; 3M Corporation. Use 3M CP 25N/S Caulk for penetrations of vertical partitions and CP 25S/L Caulk for penetrations of horizontal partitions.
 - b. Acoustical Sealant; Specified Technologies, Inc.
 - c. FS 1900 Series Sealant Intumescent Elastomeric Firestop; International Protective Coatings, Inc.

2.3 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material 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.

2.4 MISCELLANEOUS MATERIALS

- A. Joint Primer/Sealer: Material as recommended by joint-sealant manufacturer.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer.
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean masonry, concrete and similar porous joint substrate surfaces by brushing or other non-abrasive method which will not damage surface and will 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.
 - 3. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - 4. Remove protective coatings of metal prior to sealant application.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply. All sealing shall be such to produce a weather tight and complete, neat appearance whether or not specifically indicated on Drawings.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform flush joint profile beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 SEALANT APPLICATIONS

- A. Sealant applications are general recommendations. Sealant types must meet the needs of the particular project application.
- B. Application of Sealant Type 1 (Polyurethane): Apply continuously in all interior and exterior traffic bearing and non-traffic bearing joints required to be sealed such as control joints, expansion joints, joints at exterior hollow metal, perimeter joints of frames for doors, windows, flashing, louvers, dissimilar materials, and void or exposed joints in like materials. Install per manufacturer's written instructions.
- C. Application of Sealant Type 2 (Acrylic-Latex): Apply continuously in minor interior joints which do not exceed 1/16" width such as at casing beads, joints at interior hollow metal to drywall or interior hollow metal to masonry, joints at suspension ceiling edge angles to masonry, etc. Install per manufacturer's written instructions.
- D. Application of Sealant Type 3 (Silicone): Apply continuously in interior locations subject to high moisture conditions and for non-porous surfaces such as ceramic tile, fiberglass, metal, or vinyl or resilient materials. Seal the perimeters of toilet room fixtures where they come into contact with floors, countertops and walls. Install per manufacturer's written instructions.

- E. Application of Sealant Type 4 (Acoustical): Apply continuously in locations indicated in drawings where acoustical sealant is required for acoustical separation. Install per manufacturer's written instructions for materials and applications indicated.

END OF SECTION 079200

SECTION 079500 - EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes interior and roof expansion joint cover assemblies in locations indicated in Drawings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For adhesives, indicating VOC content.
 - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For each expansion joint cover assembly.
 - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams.
- D. Samples: For each expansion joint cover assembly and for each color and texture specified, 6 inches in length minimum.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Provide all expansion joint assembly components from a single manufacturer for a complete installation.
- B. Furnish units in longest practicable lengths to minimize field splicing.
- C. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

EXPANSION JOINT COVER ASSEMBLIES

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2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to IBC 2015 and SEI/ASCE 7-10.
- B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E1966 by a qualified testing agency.
 - 1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.
- C. Expansion Joint Design Criteria: Refer to S001 for criteria.
 - 1. Type of Movement: Thermal.
 - a. Nominal Joint Width: As indicated on Drawings.
 - b. Minimum Joint Width: As indicated on Drawings.
 - c. Maximum Joint Width: As indicated on Drawings.
 - 2. Type of Movement: Seismic.
 - a. Joint Movement: As indicated on Drawings.

2.3 FLOOR EXPANSION JOINT COVERS

- A. Metal-Plate Floor Joint Cover: Metal cover plate fixed on one side of joint gap and free to slide on other.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC.
 - b. Balco; a CSW Industrials Company.
 - c. BASF Corp. - Watson Bowman Acme Corp.
 - d. Construction Specialties, Inc.
 - e. Inpro Corporation.
 - f. MM Systems Corporation.
 - g. Nystrom.
 - 2. Application: Floor where indicated in Drawings.
 - 3. Installation: Surface mounted.
 - 4. Load Capacity:
 - a. Uniform Load: 100 lb/sq. ft..
 - b. Concentrated Load: 300 lb.
 - c. Maximum Deflection: 0.0625 inch.
 - 5. Fire-Resistance Rating: Not less than that indicated on Drawings and that of adjacent construction.
 - 6. Cover-Plate Design: Plain.
 - 7. Exposed Metal:
 - a. Aluminum: Manufacturer's standard color anodic for application.
 - 1) Color: Dark bronze.

2.4 WALL EXPANSION JOINT COVERS

- A. Metal-Plate Wall Joint Cover : Metal cover plate fixed on one side of joint gap and free to slide on other.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC.
 - b. Balco; a CSW Industrials Company.
 - c. BASF Corp. - Watson Bowman Acme Corp.
 - d. Construction Specialties, Inc.
 - e. Inpro Corporation.
 - f. MM Systems Corporation.
 - g. Nystrom.
 2. Application: Where indicated in Drawings.
 3. Fire-Resistance Rating: Not less than that indicated on Drawings.
 4. Exposed Metal:
 - a. Aluminum: Manufacturer's standard color anodic for application.
 - 1) Color: Dark bronze.

2.5 CEILING EXPANSION JOINT COVERS

- A. Flush Mounted Ceiling Joint Cover: Assembly for interior applications.
1. Basis of Design: Subject to compliance with requirements, Basis of Design Manufacturer is Construction Specialties, Inc. 6696 Route 405 Highway, Muncy, PA. Basis of Design product: Construction Specialties, Inc. model HC for ceiling to ceiling joint systems and Construction Specialties, Inc. model HCW for wall to ceiling joint systems.
 2. Application: As indicated in Drawings.
 3. Type: Accordion.
 4. Seal Material: PVC.
 5. Color: As selected by Architect from Manufacturer's standard range.
 6. Fire-Resistance Rating: Not less than that indicated on Drawings.

2.6 ROOF EXPANSION JOINT SYSTEM

- A. Flexible Roof Expansion Joint System: Flexible, weatherproof expansion joint system suitable for exterior application.
1. Basis of Design: Subject to compliance with requirements, Basis of Design is WaboFlash model EEJ manufactured by Watson Bowman Acme Corporation, 95 Pineview Drive, Amherst, New York 14228.
 2. Application: As indicated in Drawings.
 3. System Description: System shall incorporate a flexible rubber membrane supported by a closed cell foam (horizontal applications) to form a flexible bellows profile incorporating two metal flanges, adhesively and mechanically attached to the bellows by bifurcation process. System's minimum transverse movement capability shall accommodate +/-50

percent of the nominal design opening. Provide factory fabricated transitions designed for maximum flexibility incorporating necessary fabrication techniques to ensure watertightness and clean seam lines.

4. Roof Load Capacity:
 - a. Uniform Load: 40 lb/sq. ft..
 - b. Concentrated Load: 300 lb.
 - c. Maximum Deflection: 0.0625 inch.
5. Joint Movement Capability: As indicated on Drawings.
6. Fire Barrier: Manufacturer's standard fire barrier for fire-resistance-rated expansion joint system.

B. Materials:

1. Bellow Profile - The profile shall meet the requirements of the properties listed below unless specified otherwise.
 - a. Flexible Membrane Cover: 60 mil (1.5 mm) EPDM sheet - black
 - b. Support Foam: Closed cell foam, k factor 0.25 BTU · in/(hr·ft²·°F) at ambient
 - c. Thickness varies from 3/8" to 3/4" (10 mm to 19 mm) depending on bellows width.
2. Flange Metal: Galvanized steel, 26 ga
3. Accessories: Provide necessary and related splice kits required for complete installation.
4. Fabrication: Factory fabricate all directional changes (transitions) and system terminations.
5. Finish: Seal profile: black.

2.7 MATERIALS

- A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Fire Barriers: Any material or material combination, to comply with performance criteria for required fire-resistance rating.
- D. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.
- E. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M.
- F. Adhesives: As recommended by roof-expansion-joint manufacturer.
 1. Adhesives shall have a VOC content of 70 g/L or less.
 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- G. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
 - 1. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being fastened.
- H. Mineral-Fiber Blanket: ASTM C665.
- I. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187.

2.8 ALUMINUM FINISHES

- A. Mill finish.
- B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

2.9 ACCESSORIES

- A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.
 - 1. Provide where indicated on Drawings.
- B. Manufacturer's standard attachment devices, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies.
- C. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- D. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
 - 1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
 - 2. Install frames in continuous contact with adjacent surfaces.
 - a. Shimming is not permitted.
 - 3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.

4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
 5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
 7. Provide in continuous lengths for straight sections.
 8. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 9. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- E. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- F. Bellows joint systems shall be installed in strict accordance with the manufacturer's typical details and instructions.
- G. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.
- H. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.
- I. Moisture Barrier Drainage: If indicated, provide drainage fittings and connect to drains.
- 3.2 PROTECTION
- A. Do not remove protective covering until finish work in adjacent areas is complete.
 - B. Protect the installation from damage by work of other Sections.

END OF SECTION 079500

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.
3. Light frames and glazing installed in hollow metal doors.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Flush Wood Doors".
3. Division 08 Section "Metal Sound Control Door Assemblies."
4. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
5. Division 08 Section "Door Hardware."
6. Division 09 Sections "Painting" for field painting hollow metal doors and frames.
7. Division 28 Section "Access Control" for access control devices installed at door openings and provided as part of a security access control system.
8. Door Schedule on Drawings.

C. 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.

1.3 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 anchorages, joints, field splices, and connections.
 6. Details of accessories.
 7. Details of moldings, removable stops, and glazing.
 8. Details of conduit and preparations for power, signal, and control systems.
- D. 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.

1.4 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. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
 3. Smoke Control Door Assemblies: Comply with NFPA 105.
 - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are 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. Provide labeled glazing material.
- E. Where indicated in Fire-Rated Doors, provide fire-rated, safety-rated glass with integral blinds.
1. Basis of Design: Pilington Pyrostop combined with Vision Control integrated cord-free louvers in UL-tested fire protection-rated glazing system manufactured by Unicel Architectural.
 2. Provide all components for a complete installation.
- F. Energy Efficient Exterior Openings: Comply with minimum thermal ratings, based on ASTM C1363. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.
1. Thermal Performance (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM C1363 and meet or exceed the following requirements:
 - a. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.29, R-Value 3.4, including insulated door, thermal-break frame and threshold.
 2. Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM E283 to meet or exceed the following requirements:
 - a. Rate of leakage of the door assembly shall not exceed 0.25 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).
- G. Sound Transmission Class (STC) Rated Doors: Provide sound transmission class rated doors fabricated as sound-reducing types with testing according to ASTM E 90, and classifications according to ASTM E 413. Submit manufacturer's written results of STC ratings from testing performed by a qualified independent testing agency for sound resistant doors.

- H. 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.

1.5 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.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 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.

1.8 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:

1. CECO Door Products (CE).
2. Curries Company (CU).
3. Steelcraft (ST).

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 HOLLOW METAL DOORS

- 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. Exterior Doors (Energy Efficient): Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. 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. Design: Flush panel.
2. Core Construction: Foamed in place polyurethane and steel reinforced core with no stiffener face welds.
 - a. Provide 18 gauge steel vertical reinforcements 6 inches apart and welded in place. Foamed in place polyurethane core is chemically bonded to all interior surfaces. No face welding is permitted.
 - b. Thermal properties to rate at a fully operable minimum U-Factor 0.374 and R-Value 2.53, including insulated door, Mercury thermal-break frame and threshold.
 - c. Kerf Type Frames: Thermal properties to rate at a fully operable minimum U-Factor 0.378 and R-Value 2.5, including insulated door, kerf type frame, and threshold.
3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
5. 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. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".

7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. 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. Design: Flush panel.
 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
 4. 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.
 5. 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.
 6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Manufacturers Basis of Design:
1. Curries Company (CU) - Polystyrene Core - 707 Series.
 2. Curries Company (CU) - Energy Efficient - 797 Mercury Series.

2.4 SPECIAL FUNCTION HOLLOW METAL DOORS

- A. Sound Resistant Doors: Subject to the same compliance standards and requirements as standard hollow metal doors, provide manufacturer's standard sound resistant acoustic core tested in accordance with ASTM E90, ASTM 413, and ASTM E1332 standards. Fabricate with minimum 16 gauge construction, 1-3/4" thickness, combined with standard flush frames designed for mid-range and high range sound attenuation from STC 39 through STC 52 applications. Furnish complete with perimeter sound seals, bottom seals, and threshold as required for specified STC rating.
1. Provide sound resistant doors with minimum STC sound rating (32, 38, 41, 43, 46, 50, 52, 54) as indicated on the door schedule:
 2. Each unit to bear a physical label applied to door certifying the product construction and identifying the specific STC rating.
 3. Manufacturers Basis of Design:
 - a. Curries Company (CU) - 757 Quiet Noise Series.

2.5 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16" positive thermal break and integral vinyl weatherstripping.
- C. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
 - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 - 2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
 - 3. Manufacturers Basis of Design:
 - a. Curries Company (CU) - Thermal Break TQ Series.
- D. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
 - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 - 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
 - 3. Manufacturers Basis of Design:
 - a. Curries Company (CU) - M Series.
- E. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- F. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.6 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.7 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.

2.8 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.9 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. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
 - 2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
 - 3. 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.
 - 4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
 - 5. Electrical Raceways: Provide hollow metal doors to receive electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware". Wire nut connections are not acceptable.

D. Hollow Metal Frames:

1. 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.
2. 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.
3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
4. 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.
5. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
6. 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.
7. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
9. 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.

10. 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".
 11. 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 work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.10 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.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 - 4. 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.
- 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.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-core flush wood doors.
 - 2. Seven-ply flush wood solid core veneer-faced doors for transparent finish.
 - 3. Seven-ply flush solid core wood doors for opaque finish.
 - 4. Factory finishing flush wood doors.
 - 5. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Requirements:
 - 1. Section 088000 "Glazing" for glass view panels in flush wood doors.
 - 2. Section 081113 "Hollow Metal Doors and Frames" for flush wood doors installed in hollow metal frames.
 - 3. Section 087100 "Door Hardware."
 - 4. Door Schedule in Drawings.

1.3 PREINSTALLATION MEETINGS

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

1.4 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 louvers.
 - 5. Door trim for openings.
 - 6. Door frame construction.
 - 7. Factory-machining criteria.
 - 8. Factory- finishing specifications.

- B. Sustainable Design Submittals:
 - 1. Environmental Product Declaration (EPD): For each product.
 - 2. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
 - 3. Chain-of-Custody Qualification Data: For manufacturer and vendor.
 - 4. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 5. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

- C. 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 and frame 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 frame for each frame type, including dimensions and profile.
 - 4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
 - 5. Dimensions and locations of blocking for hardware attachment.
 - 6. Dimensions and locations of mortises and holes for hardware.
 - 7. Clearances and undercuts.
 - 8. Requirements for veneer matching.
 - 9. Doors to be factory finished and application requirements.

- D. Samples for Initial Selection: For factory-finished doors and factory-finished door frames.

- E. Samples for Verification:
 - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
 - 2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
 - 3. Louver blade and frame sections, 6 inches long, for each material and finish specified.
 - 4. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Special warranties.

1.7 QUALITY ASSURANCE

- A. Certified Wood: Provide an invoice including vendor's chain-of-custody number, product cost, and entity being invoiced.
- B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.
- C. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies shall comply with qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in cardboard cartons, and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of construction period.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors and frames that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors and frames.
 - 3. Warranty Period for Solid-Core Exterior Doors: Five years from date of Substantial Completion.
 - 4. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flush wood doors and wood paneling from single manufacturer.

2.2 FLUSH WOOD DOORS AND FRAMES, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards."
- B. Regional Materials: Wood doors shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- C. Certified Wood: Wood doors shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
- D. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.

2.3 SEVEN-PLY FLUSH SOLID CORE WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Doors in locations indicated for transparent finish:
 - 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. ABS-American Building Supply, Inc.
 - b. General Veneer Manufacturing Co.
 - c. Haley Brothers, Inc.
 - d. Lambton Doors.
 - e. Oregon Door.
 - 2. Performance Grade:
 - a. ANSI/WDMA I.S. 1A Heavy Duty unless otherwise indicated on Drawings.
 - 3. Architectural Woodwork Standards Grade: Premium.
 - 4. Faces: Single-ply wood veneer not less than 1/50 inch thick or two-ply wood panel with wood veneer not less than 1/50 inch thick.
 - a. Species: White oak.

- b. Cut: Quarter sliced.
 - c. Match between Veneer Leaves: Book match.
 - d. Assembly of Veneer Leaves on Door Faces: Center-balance match. Face and back veneer center balance matched with an equal number of leaves per face and an equal number of leaves per back
 - 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.
 - g. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
5. Exposed Vertical and Top 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: Solid core, either glued wood stave or WDMA I.S. 10 structural composite lumber.
7. Core for Fire-Rated Doors: Solid core, and 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 needed to eliminate through-bolting hardware.
8. Construction: Seven plies, manufacturer's standard for application, hot-pressed or cold-pressed, bonded or unbonded.

2.4 SEVEN-PLY FLUSH SOLID CORE WOOD DOORS FOR OPAQUE FINISH

- A. Interior Doors in locations indicated for opaque finish:
- 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. ABS-American Building Supply, Inc.
 - b. General Veneer Manufacturing Co.
 - c. Haley Brothers, Inc.
 - d. Lambton Doors.
 - e. Oregon Door.
 - 2. Performance Grade: ANSI/WDMA I.S. 1A Heavy Duty.
 - 3. Architectural Woodwork Standards Grade: Premium.
 - 4. Faces: Any closed-grain hardwood of mill option.
 - 5. Exposed Vertical and Top Edges: Any closed-grain hardwood.
 - 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.
- c. Mineral Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - 1) Screw-Holding Capability: 475 lbf in accordance with WDMA T.M. 10.
- 6. Core for Non-Fire-Rated Doors: Either glued wood stave or WDMA I.S. 10 structural composite lumber.
- 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 needed to eliminate through-bolting hardware.
- 8. Construction: Seven plies, manufacturer's standard for application, hot-pressed or cold-pressed, bonded or unbonded.

2.5 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: Manufacturer's standard shape unless indicated otherwise.
 - 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.
- C. Wood Louvers: Where indicated, door manufacturer's standard solid-wood louvers unless otherwise indicated.
 - 1. Wood Species: Same species as door faces.
 - 2. Profile: Flat.

2.6 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.
5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Transom and Side Panels:

1. Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors.
2. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
3. Fabricate door and transom panels with full-width, solid-lumber meeting rails.
4. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. 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.
3. Louvers: Factory install louvers in prepared openings.

E. Exterior Doors: Factory treat exterior doors with water repellent after fabrication has been completed but before factory finishing.

2.7 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.
3. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:

1. Architectural Woodwork Standards Grade: Premium.
2. Finish and Sheen: As selected by Architect from manufacturer's full range.
3. Staining: As selected by Architect from manufacturer's full range.

D. Opaque Finish:

1. Architectural Woodwork Standards Grade: Premium.
2. Finish and Sheen: As selected by Architect from manufacturer's full range.
3. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For type and installation, see Section 087100 "Door Hardware."
- B. Install doors and frames 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.
 - 2. Anchor frames to anchors or blocking built in or directly attached to substrates.
 - a. Secure with countersunk, concealed fasteners and blind nailing.
 - b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1) For factory-finished items, use filler matching finish of items being installed.
 - 3. Install fire-rated doors and frames in accordance with NFPA 80.
 - 4. 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. Machine doors for hardware.
 - 3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 4. Clearances, unless indicated otherwise:
 - a. Provide 1/8 inch at heads, jambs, and between pairs of doors.
 - b. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
 - c. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - d. Comply with NFPA 80 for fire-rated doors.
 - 5. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 - 6. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

- E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 FIELD QUALITY CONTROL

- A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- C. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 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 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes access doors and frames for ceilings and walls.
- B. Related Requirements:
 - 1. Section 077200 "Roof Accessories" for roof hatches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches in size.

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. Milcor; Commercial Products Group of Hart & Cooley, Inc.

2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
3. Locations: Ceiling at locations as indicated in Drawings or as required for Project requirements.
4. Door Size: As indicated, minimum 24x24 inches.
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
6. Frame Material: Same material and thickness as door.
7. Latch and Lock: Cam latch, screwdriver operated.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, 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. Nystrom.
2. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with concealed flange for gypsum board installation, self-closing door, and concealed hinge.
3. Locations: Wall and ceiling where indicated in Drawings or to meet Project requirements.
4. Door Size: As indicated.
5. Fire-Resistance Rating: Not less than that indicated and that of adjacent construction.
6. Uncoated Steel Sheet for Door: Manufacturer's standard for application, nominal 0.036 inch, 20 gage, factory primed.
7. Frame Material: Same material, thickness, and finish as door.
8. Latch and Lock: Self-closing, self-latching door hardware, operated by key, with interior release.

2.4 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. Aluminum Extrusions: ASTM B 221, Alloy 6063.
- D. Aluminum Sheet: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- E. Frame Anchors: Same material as door face.

- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.5 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

SECTION 083313 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Wood overhead coiling counter door where indicated in Drawings.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for support framing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of coiling counter door and accessory, including preparation instructions and recommendations, storage and handling requirements and recommendations, and installation methods.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
 - 1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 2. Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent construction.
 - 3. Samples: For each finish product specified, two samples, minimum size 6 inches long, representing actual product, color, and finish.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years' experience in the fabrication and installation of security closures.

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- B. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- C. 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 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- C. Store materials in a dry, warm, ventilated weathertight location.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8 COORDINATION

- A. Coordinate Work with other operations and installation of adjacent finish materials to avoid damage to installed materials.

PART 2 - PRODUCTS

2.1 COILING COUNTER DOOR ASSEMBLY

- A. Counter Door: Wood overhead coiling counter door with integral frame.
 1. Basis of Design Manufacturer and Product: Series 665 manufactured by Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: info@overheaddoor.com.
 2. Curtain: Interlocking wood slats, 1-5/8 inch (41 mm) high by 1/2 inch (12.5 mm) thick. Bottom bar shall have flush lift handles.
 3. Slat Material and Finish: White Oak, with finish as selected by Architect from manufacturer's standard finishes.
 4. Guides: Wood matching slat material.
 5. Brackets: Galvanized steel to support counterbalance, curtain and hood.

6. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch (0.8 mm) per foot of span. Counterbalance shall be adjustable by means of an adjusting tension wheel.
7. Hood: Provide intermediate support brackets as required. Hood fabricated of wood matching slats.
8. Operation: Manual push up with manufacturer's standard handles for application.
9. Locking: Cylinder locks.
10. Wall Mounting Condition: As indicated in Drawings.

2.2 HOODS

- A. General: Form hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

2.3 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism for application.

2.4 MANUAL DOOR OPERATORS

- A. General: Equip door with manual door operator by door manufacturer.
- B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf.
- C. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25-lbf force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify opening sizes, tolerances, and conditions are acceptable.
- B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.
- F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 079200 "Joint Sealants."
- G. Install perimeter trim and closures

3.4 ADJUSTING

- A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
- B. Remove labels and visible markings.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

- A. Protect installed products until completion of project.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 083313

SECTION 083323 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Service doors.
 - 2. Insulated service doors.
 - 3. Fire-rated service doors.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
 - 3. Include description of automatic-closing device and testing and resetting instructions.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
 - 5. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
 - 6. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:
1. Curtain slats.
 2. Bottom bar with sensor edge.
 3. Guides.
 4. Brackets.
 5. Hood.
 6. Locking device(s).
 7. Include similar Samples of accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Special warranty.
- B. Maintenance Data: For overhead coiling doors to include in maintenance manuals.
- C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.6 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.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
 - 1. Obtain operators and controls from overhead coiling-door manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Complying with NFPA 80; listed and labeled by qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.
- B. Sound-Control Doors: Assemblies tested in a laboratory for sound-transmission-loss performance according to ASTM E90, calculated according to ASTM E413, and rated for not less than the STC value indicated.
- C. Accessibility Standard: Comply with applicable provisions in the ABA standards of the Federal agency having jurisdiction, with Authorities Having Jurisdiction, and ICC A117.1.
- D. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:
 - 1. Design Wind Load: As indicated on Drawings.
 - 2. Testing: According to ASTM E330/E330M.
 - 3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
- E. Windborne-Debris Impact Resistance: Provide overhead coiling doors that pass ASTM E1886 missile-impact and cyclic-pressure tests according to ASTM E1996 for basic protection.

2.3 DOOR ASSEMBLY

- A. Insulated Service Door: Overhead coiling doors formed with curtain of interlocking metal slats. Refer to Door Schedule on Drawings for locations of each.
 - 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. Overhead Door Corporation.
 - b. Cookson Company.
 - c. Cornell.
 - 2. Type, Size, and Location: As indicated in Drawings and Door Schedule.

- B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
- C. Air Infiltration: For insulated door, maximum rate of 0.4 cfm/sq. ft. (2.03 L/s per sq. m) at 15 and 25 mph (24.1 and 40.2 km/h) when tested according to ASTM E283.
- D. STC Rating: Minimum 26.
- E. Curtain R-Value for Insulated Door: 6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W).
- F. Door Curtain Material: Galvanized steel.
- G. Door Curtain Slats: Flat profile slats of 2-5/8-inch (67-mm) center-to-center height.
 - 1. Insulated-Slat Interior Facing: Metal.
 - 2. Gasket Seal. Manufacturer's standard continuous gaskets between slats.
- H. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch (38 by 38 by 3 mm) thick; fabricated from hot-dip galvanized steel and finished to match door.
- I. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- J. Hood: Match curtain material and finish.
 - 1. Shape: As indicated on Drawings.
 - 2. Mounting: As indicated on Drawings.
- K. Locking Devices: Equip door with locking device assembly.
 - 1. Locking Device Assembly: Cremona-type, both jamb sides locking bars, operable from inside with thumbturn.
- L. Manual Door Operator: Manufacturer's standard chain-hoist operator.
 - 1. Provide operator with through-wall shaft operation where applicable.
- M. Electric Door Operator:
 - 1. Usage Classification: Standard duty, up to 25 cycles per hour and up to 90 cycles per day.
 - 2. Operator Location: As indicated on Drawings.
 - 3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet (2.44 m) or lower.
 - 4. Motor Exposure: Interior and Exterior, wet, and humid where indicated.
 - 5. Motor Electrical Characteristics shall be as recommended by door operator. Basis of design characteristics are as follows:
 - a. Horsepower: 1/2 hp.
 - b. Voltage: 115-V ac, single phase, 60 Hz.
 - 6. Emergency Manual Operation: Push-up type.
 - 7. Obstruction-Detection Device: Manufacturer's standard Automatic for application.
 - 8. Control Station(s): Interior mounted unless indicated otherwise on Drawings.

9. Other Equipment: Audible and visual signals

N. Curtain Accessories: Equip door with weather seals, push/pull handles, pull-down strap and automatic-closing device.

O. Door Finish:

1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.4 FIRE-RATED DOOR ASSEMBLY

A. Fire-Rated Insulated Service Door: Overhead fire-rated coiling door formed with curtain of interlocking metal slats.

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. Overhead Door Corporation.
 - b. Cookson Company.
 - c. Cornell.

B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

C. Fire Rating: As indicated in Drawings for application.

D. Air Infiltration: Maximum rate of 0.4 cfm/sq. ft. (2.03 L/s per sq. m) at 15 and 25 mph (24.1 and 40.2 km/h) when tested according to ASTM E283 or DASMA 105.

E. STC Rating: 27 unless indicated otherwise.

F. Curtain R-Value: 6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W).

G. Door Curtain Material: Galvanized steel.

H. Door Curtain Slats: Flat profile slats of 2-5/8-inch (67-mm) center-to-center height, unless indicated otherwise.

1. Insulated-Slat Interior Facing: Metal.

I. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.

J. Hood: Match curtain material and finish.

1. Shape: As indicated on Drawings.
2. Mounting: As indicated on Drawings.

- K. Locking Devices: Equip door with locking device assembly.
 - 1. Locking Device Assembly: Manufacturer's standard for application, Cremona-type, both jamb sides locking bars, operable from inside with thumbturn.
- L. Manual Door Operator: Manufacturer's standard chain-hoist operator.
- M. Electric Door Operator:
 - 1. Usage Classification: Standard duty, up to 25 cycles per hour and up to 90 cycles per day.
 - 2. Operator Location: As indicated on Drawings.
 - 3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet (2.44 m) or lower.
 - 4. Motor Exposure: Interior and exterior, wet, and humid where indicated.
 - 5. Motor Electrical Characteristics:
 - a. Horsepower: 1/2 hp.
 - b. Voltage: 115-V ac, single phase, 60 Hz.
 - 6. Emergency Manual Operation: Push-up type.
 - 7. Obstruction-Detection Device: Manufacturer's standard automatic for application.
 - a. Sensor Edge Bulb Color: As selected by Architect from manufacturer's full range.
 - 8. Control Station(s): Where indicated on Drawings.
 - 9. Other Equipment: Audible and visual signals.
- N. Curtain Accessories: Equip door with smoke seals, automatic-closing device, pull-down strap and automatic closing device where applicable.
- O. Door Finish:
 - 1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
 - 2. Factory Prime Finish: Manufacturer's standard color.
 - 3. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.5 MATERIALS, GENERAL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.6 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 - 1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural-steel sheet; complying with ASTM A653/A653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch (0.71 mm); and as required.

2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84 or UL 723. Enclose insulation completely within slat faces.
 3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, with minimum steel thickness of 0.010 inch (0.25 mm).
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.

2.7 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
1. Galvanized Steel: Nominal 0.028-inch- (0.71-mm-) thick, hot-dip galvanized-steel sheet with G90 (Z275) zinc coating, complying with ASTM A653/A653M.
 2. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant. Bird netting should be incorporated for pest control of any open areas. All hardware to be stainless steel security type.

2.8 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
1. Lock Cylinders: As standard with manufacturer and keyed to building keying system.
 2. Keys: As specified by owner for each cylinder.
- B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.9 CURTAIN ACCESSORIES

- A. Smoke Seals: Equip each fire-rated door with replaceable smoke-seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency.

- B. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant and pest-controlled installation unless otherwise indicated.
 - 1. At door head, use 1/8-inch- (3-mm-) thick, replaceable, continuous-sheet baffle secured to inside of hood or field-installed on the header.
 - 2. At door jambs, use Manufacturer's standard replaceable, adjustable, continuous, flexible, 1/8-inch- (3-mm-) thick seals of flexible vinyl, rubber, or neoprene nylon brushes.
- C. Astragal for Interior Doors: Where indicated, equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
- D. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.
- E. Pull-Down Strap: Provide pull-down straps for doors more than 84 inches (2130 mm) high.
- F. Automatic-Closing Device: Equip each fire-rated door with an automatic-closing device or holder-release mechanism and governor unit complying with NFPA 80 and an easily tested and reset release mechanism. Automatic-closing device shall be designed for activation by the following:
 - 1. Replaceable fusible links with temperature rise and melting point of 165 deg F (74 deg C) interconnected and mounted on both sides of door openingManufacturer's standard UL-labeled smoke detector and door-holder-release devices.
 - 2. Manufacturer's standard UL-labeled heat detector and door-holder-release devices.
 - 3. Building fire-detection, smoke-detection, and -alarm systems.

2.10 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load.
- C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
 - 1. Fire-Rated Doors: Equip with auxiliary counterbalance spring and prevent tension release from main counterbalance spring when automatic-closing device operates.

- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.11 MANUAL DOOR OPERATORS

- A. General: Where applicable, equip door with manual door operator by door manufacturer.
- B. Push-up Door Operation: Lift handles and pull rope for raising and lowering doors, with counterbalance mechanism designed so that required lift or pull for door operation does not exceed 25 lbf (111 N).
- C. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25-lbf (111-N) force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

2.12 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 1. Comply with NFPA 70.
 - 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Door Operator Location(s): Operator location as indicated for each door.
 - 1. Top-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on top of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.
 - 2. Front-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on coil side of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.
 - 3. Wall Mounted: Operator is mounted to the inside front wall on the left or right side of door and connected to door drive shaft with drive chain and sprockets. Side room is required for this type of mounting. Wall-mounted operator can also be mounted above or below shaft; if above shaft, headroom is required.
 - 4. Bench Mounted: Operator is mounted to the right or left door head plate and connected to the door drive shaft with drive chain and sprockets. Side room is required for this type of mounting.

5. Through-Wall Mounted: Operator is mounted on other side of wall from coil side of door.
- D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each door assembly.
 1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
 2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 3. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
 - E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
 - F. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.
 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
 - a. 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 or constant pressure on close button.
 2. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Self-Monitoring Type: Four-wire-configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.
 3. Pneumatic Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device.
 - G. Control Station: Key switch control station in fixed location with momentary-contact position controls labeled "Open" and "Stop" and sustained- or constant-pressure position control labeled "Close." Key station to use replaceable cylinder that matches the existing standard cylinder system.
 1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
 2. Exterior-Mounted Units: Full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
 - H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).
 - I. 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.

- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with the accessibility standard.

2.13 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.14 STEEL AND GALVANIZED-STEEL FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.

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- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with the accessibility standard.
- D. Power-Operated Doors: Install according to UL 325.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Test door release, closing, and alarm operations when activated by smoke detector or building's fire-alarm system. Test manual operation of closed door. Reset door-closing mechanism after successful test.
 - 2. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, section 5.2.
- B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- D. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. After electrical circuitry has been energized, operate doors to confirm proper motor rotation and door performance.
 - 3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.5 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
 - 1. Adjust exterior doors and components to be weather resistant.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.

3.6 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12months' full maintenance by skilled employees of coiling-door Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Perform maintenance, including emergency callback service, during normal working hours.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323

SECTION 083473.13 - METAL SOUND CONTROL DOOR ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes the furnishing and installation of all metal sound retardant doors and frames and adjusting of all acoustical seals as scheduled on the drawings and specified herein.
 - 1. Include sound retardant fire doors as scheduled.
 - 2. Includes metal sound retardant doors with wood veneer finish.
 - 3. Provide complete assemblies, including door, frame and seals.
 - 4. Supervision by door manufacturer of adjusting acoustical seals.
- B. Related Requirements:
 - 1. Section 081113 "Hollow Metal Doors and Frames" for hollow-metal frames.
 - 2. Section 081416 "Flush Wood Doors" for wood veneer information.
 - 3. Section 087100 "Door Hardware" for additional door hardware not specified here.

1.3 COORDINATION

- A. Coordinate installation of anchorages for sound control door assemblies. Furnish setting drawings, templates, and directions for installing anchorages. Deliver sleeves, inserts, anchor bolts, and items with integral anchors to Project site in time for installation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review procedures for coordinating frame and anchor installation with wall construction.
 - 2. Review required field quality-control procedures.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include sound ratings, construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.
- B. Shop Drawings: For sound control door assemblies.
 - 1. Include elevations of each door design.

2. Include details of sound control seals, door bottoms, and thresholds.
 3. Include details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 4. Include frame details for each frame type, including dimensioned profiles and metal thicknesses.
 5. Include locations of reinforcements and preparations for hardware.
 6. Include details of each different wall opening condition.
 7. Include details of anchorages, joints, field splices, and connections.
 8. Include details of accessories.
 9. Include details of moldings, removable stops, and glazing.
 10. Include details of conduits and preparations for power, signal, and control systems.
- C. Samples for Initial Selection: For units with factory-applied finishes.
1. Wood veneer at door to match veneer specified in Section 081416 "Flush Wood Doors."
- D. Schedule: Provide a schedule of sound control door assemblies prepared using same reference numbers for details and openings as those on Drawings. Coordinate with the Door Hardware Schedule.
- B. INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer, manufacturer, and acoustical testing agency.
- B. Product Certificates: For each type of sound control door assembly.
1. Product Laboratory Test Reports: For each sound control door assembly, provide acoustical test reports from an independent acoustical testing laboratory as specified below including installation instructions. The acoustical testing laboratory shall have been accredited by the U.S. Department of Commerce, National Bureau of Standards under the National Voluntary Laboratory Accreditation Program (NVLAP) for this test procedure.
 2. Field Test Reports: The manufacturer shall submit field (NIC) tests performed by an independent Acoustical Consultant on at least two previously installed acoustical doors. The basic construction, including frame and seals must be identical to the doors specified herein and shall be fully described in the test reports.
- C. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.
- D. Field quality-control reports.
- E. Sample Warranty: For manufacturer's special warranties.
- C. CLOSEOUT SUBMITTALS
- A. Maintenance Data: For sound control door assemblies to include in maintenance manuals.

D. QUALITY ASSURANCE

- A. Manufacturer Qualifications: A company that has regularly specialized in the manufacture of metal sound retardant doors for a period of at least ten (10) years.
 - 1. The manufacturer shall submit laboratory and field tests as discussed in section 1.6-B.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- C. Acoustical Testing Agency Qualifications: An independent agency accredited as an acoustical laboratory according to the National Voluntary Laboratory Accreditation Program of NIST.

E. DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Avoid the use of nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

F. WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of sound control door assemblies that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet sound rating requirements.
 - b. Faulty operation of sound seals.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use or weathering.
 - 2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

A. PERFORMANCE REQUIREMENTS

- A. Sound Rating: Provide sound control door assemblies identical to those of assemblies tested as sound-retardant units by an acoustical testing agency, and have the following minimum rating:
 - 1. STC Rating: As indicated in the Door Schedule. As calculated by ASTM E 413 when tested in an operable condition according to ASTM E 90.

2. NIC Rating: The doors shall provide a Noise Isolation Class (NIC) which is no less than 5 points below the scheduled STC performance. Test shall be measured in accordance with ASTM E-336-97 and classified in accordance with ASTM E413-90
3. The door shall be fully operable at the time of test and shall be opened and closed several times prior to measurement. The test shall be on the exact door/frame/seal assembly that is to be supplied for the project. It shall be tested as a complete assembly. A test for the door and a separate test for the acoustical seals is not acceptable.

- B. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

B. STEEL SOUND CONTROL DOORS

- A. All doors, frames and seals specified herein shall be manufactured by Krieger Steel Products, Noise Barriers LLC or Overly Door Company. Other manufacturers must be approved in writing prior to bidding by the project's Acoustical Consultant.
- B. Source Limitations: Obtain steel sound control door assemblies, including doors, frames, sound control seals, hinges, thresholds, and other items essential for sound control, from single source from single manufacturer.
- C. Source Limitations: Obtain wood veneer for hardwood veneer plywood paneling; hardwood veneer perforated plywood paneling, and flush wood doors from single manufacturer. Wood veneer specified in Section 081416 "Flush Wood Doors."
- D. Doors: Flush-design sound control doors, thickness as required to provide STC rating, of seamless construction; with manufacturer's standard sound-retardant core as required to provide STC and fire rating indicated. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges. Fabricate according to NAAMM-HMMA 865.
 1. Interior Doors: Fabricate from cold-rolled steel sheet unless otherwise indicated, 0.048-inch nominal thickness or thicker as required to achieve STC rating indicated.
 2. Core: Manufacturer's standard sound control core.
 3. Loose Stops for Glazed Lites in Doors: Same material as face sheets.
 4. Top and Bottom Channels: Closed with continuous channels of same material as face sheets, spot welded to face sheets not more than 6 inches o.c.
 5. Hardware Reinforcement: Same material as face sheets.
- E. Materials:
 1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 2. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with G60 zinc (galvanized) or A40 zinc-iron-alloy (galvannealed) coating designation.
 3. Glazing: As required by sound control door assembly manufacturer to comply with sound control and fire-rated-door labeling requirements.
- F. Finishes:

1. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
 - a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
2. Wood Veneer Finish: Refer to Section 081416 "Flush Wood Doors."

C. SOUND CONTROL FRAMES

- A. Frames: Fabricate sound control door frames with corners mitered, reinforced, and continuously welded the full depth and width of frame. Fabricate according to NAAMM-HMMA 865.
 1. Weld frames according to NAAMM-HMMA 820.
 2. Interior Frames: Fabricate from cold-rolled steel sheet unless otherwise indicated, 0.075-inch nominal thickness or thicker as required to provide STC rating indicated.
 3. Hardware Reinforcement: Fabricate according to NAAMM-HMMA 865 of same material as face sheets.
 4. Head Reinforcement: Metallic-coated steel channel or angle stiffener, 0.108-inch nominal thickness.
 5. Jamb Anchors:
 - a. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.064-inch nominal-thickness metallic-coated steel with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.156 inch thick.
 - b. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.048-inch nominal-thickness uncoated steel unless otherwise indicated.
 - c. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter, metallic-coated steel bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
 6. Floor Anchors: Not less than 0.079-inch nominal-thickness metallic-coated steel, and as follows:
 - a. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - b. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.
 7. Ceiling Struts: Minimum 3/8-inch-thick by 2-inch-wide uncoated steel unless otherwise indicated.
- B. Materials:
 1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 2. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with G60 zinc (galvanized) or A40 zinc-iron-alloy (galvannealed) coating designation.
 3. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M or ASTM F 2329.

4. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching sound control door frames of type indicated.
5. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.

C. Finishes:

1. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
 - a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

D. HARDWARE

A. Sound Control Door Hardware: Manufacturer's standard sound control system, including head and jamb seals, door bottoms, cam-lift hinges, and thresholds, as required by testing to achieve STC and fire rating indicated.

1. Head and Jamb Seals: One of the following:
 - a. Neoprene Compression Seals: One-piece units consisting of closed-cell sponge neoprene seal held in place by metal retainer, with retainer cover of same material as door frame; attached to door frame with concealed screws.
 - b. Silicone Compression Seals: One-piece units consisting of silicone compression bulb and stabilizer flange; attached to door frame adhesively.
 - c. Magnetic Seals: One-piece units consisting of closed-cell sponge neoprene seal and resiliently mounted magnet held in place by metal retainer, with retainer cover of same material as door frame; attached to door frame with concealed screws.
2. Door Bottoms: Neoprene or silicone gasket held in place by metal housing; mortised into bottom edge of door.
3. Cam-Lift Hinges: Full-mortise template type that raises door 1/2 inch when door is fully open; with hardened pin; fabricated from stainless steel.
4. Thresholds: Flat, smooth, unfluted type as recommended by manufacturer; fabricated from aluminum.
 - a. Configuration: As indicated on Drawings.
 - b. Finish: Clear anodic finish.

B. Other Hardware: Comply with requirements in Section 087100 "Door Hardware."

1. Power-Over-Internet locks are being used on the acoustically rated doors. These locks require a wire routed from the hinge-side jamb, to the door, and across the interior of the door to an electronic lock. Such feature shall not degrade the acoustic isolation performance of the door systems.

E. SOUND CONTROL ACCESSORIES

A. Glazing: Manufacturers' standard factory-installed glazing as required to meet specified STC rating.

F. FABRICATION

- A. Steel Sound Control Door Fabrication: Sound control doors 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.
1. Comply with requirements in NFPA 80 for fire-rated and smoke control doors.
 2. Seamless Edge Construction: Fabricate doors with faces joined at vertical edges by welding; welds shall be ground, filled, and dressed to make them invisible and to provide a smooth, flush surface.
 3. Glazed Lites: Factory install glazed lites according to requirements of tested assembly to achieve STC rating indicated. Provide fixed stops and moldings welded on secure side of door.
 4. Hardware Preparation: Factory prepare sound control doors to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping.
 - a. Reinforce doors to receive nontemplated mortised and surface-mounted door hardware.
 - b. Locate door hardware as indicated, or if not indicated, according to NAAMM-HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
 5. Tolerances: Fabricate doors to tolerances indicated in NAAMM-HMMA 865.
- B. Sound Control Frame Fabrication: Fabricate sound control frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
1. Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated from same thickness metal as frames.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 4. 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 in height.
 - 2) Three anchors per jamb from 60 to 90 inches in height.
 - 3) Four anchors per jamb from 90 to 96 inches in height.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches, or fraction thereof, more than 96 inches in height.
 - 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 in height.
 - 2) Four anchors per jamb from 60 to 90 inches in height.
 - 3) Five anchors per jamb from 90 to 96 inches in height.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches, or fraction thereof, more than 96 inches in height.

- 5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
- c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
5. Hardware Preparation: Factory prepare sound control frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping.
 - a. Reinforce frames to receive nontemplated mortised and surface-mounted door hardware.
 - b. Locate hardware as indicated, or if not indicated, according to NAAMM-HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
6. Tolerances: Fabricate frames to tolerances indicated in NAAMM-HMMA 865.

PART 3 - EXECUTION

A. EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations of sound control door frame connections before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

B. 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 sound control door frames to the following tolerances:
 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

C. INSTALLATION

- A. General: Install sound control door assemblies plumb, rigid, properly aligned, and securely fastened in place; comply with manufacturer's written instructions.
- B. Frames: Install sound control door frames in sizes and profiles indicated.
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. At openings requiring smoke and draft control, install frames according to NFPA 105.
 - c. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, and dress; make splice smooth, flush, and invisible on exposed faces.
 - d. Install sound control frames with removable glazing stops located on secure side of opening.
 - e. Remove temporary braces only after frames or bucks have been properly set and secured.
 - f. Check squareness, twist, and plumbness of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. Metal-Stud Partitions: Fully fill frames with mineral-fiber insulation.
 4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 5. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 6. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
 7. Installation Tolerances: Adjust sound control door frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Doors: Fit sound control doors accurately in frames, within clearances indicated below. Shim as necessary.

1. Non-Fire-Rated Doors: Fit non-fire-rated doors accurately in frames with the following clearances:
 - a. Jambs: 1/8 inch.
 - b. Head with Butt Hinges: 1/8 inch.
 - c. Head with Cam-Lift Hinges: As required by manufacturer, but not more than 3/8 inch.
 - d. Sill: Manufacturer's standard.
 - e. Between Edges of Pairs of Doors: 1/8 inch.
 2. Fire-Rated Doors: Install fire-rated doors with clearances according to NFPA 80.
- D. Sound Control Seals: An authorized representative of the door manufacturer shall personally supervise adjusting of acoustical seals until any and all acoustical leaks have been resolved. All costs associated with this supervision shall be borne by the door manufacturer.
- E. Cam-Lift Hinges: Install hinges according to manufacturer's written instructions.
- F. Thresholds: Set thresholds in full bed of sealant complying with requirements in Section 079200 "Joint Sealants."
- G. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with sound control door assembly manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.
- D. FIELD QUALITY CONTROL
- A. For instances where the manufacturer cannot provide suitable laboratory and field test results for the complete door assembly the doors will be tested on site at Contractor's expense as follows:
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Testing Services: Perform testing for verification that assembly complies with NIC rating requirements.
 - a. Field tests shall be conducted according to ASTM E 336, with results calculated according to ASTM E 413. Acceptable field NIC values shall be within 5 dB of scheduled laboratory STC values.
 - b. Inspection Report: Acoustical testing agency shall submit report in writing to Architect and Contractor within 24 hours after testing.
 - c. If tested door fails, replace or rework all sound control door assemblies to bring them into compliance at Contractor's expense.
 - d. Additional testing and inspecting at Contractor's expense will be performed to determine if replaced or additional work complies with specified requirements.
 3. Prepare test and inspection reports.
- E. ADJUSTING AND CLEANING
- A. Final Adjustments: Check and adjust seals, door bottoms, and other sound control hardware items right before final inspection. Leave work in complete and proper operating condition.

- B. Remove and replace defective work, including defective or damaged sound seals and doors and frames that are warped, bowed, or otherwise unacceptable.
 - 1. Adjust gaskets, gasket retainers, and retainer covers to provide contact required to achieve STC rating.

- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible, rust-inhibitive, air-drying primer.

END OF SECTION 083473.13

SECTION 084126 - ALL-GLASS ENTRANCES AND PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior swinging all-glass entrance doors and framing, including hardware.
 - 2. All-glass sidelights and transoms.
 - 3. Interior all-glass partitions.
 - 4. Metal trim and accessories in conjunction with all-glass entrances and partitions.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each component of all-glass system.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For all-glass entrances and partitions.
 - 1. Include plans, elevations, and sections.
 - 2. Include details of fittings and glazing, including isometric drawings of patch fittings and rail fittings, including showing type and thickness of glazing system, anchoring, and joining to adjacent construction.
 - 3. Door hardware locations, mounting heights, and installation requirements.
 - 4. No work shall be fabricated until shop drawings for that work have been approved by Architect for fabrication.

- D. Samples for Verification: For each type of exposed finish indicated, prepared on Samples of size indicated below.
 - 1. Metal Finishes: 6-inch- long sections of patch fittings and rail fittings, accessory fittings, and other items in specified alloy, temper, finish and thickness required for completed Work.
 - 2. Glass: 6 inches square, showing exposed-edge finish, in thickness indicated in Documents.
 - 3. Door Hardware: For exposed door hardware of each type, in specified finish, full size.
- E. Fabrication Sample: Continuous rail fitting at bottom, made from 12-inch lengths of full-size components and showing details of the following:
 - 1. Joinery.
 - 2. Anchorage.
 - 3. Glazing with butt glazing.
- F. Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors sidelights, transoms, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Product Test Reports: For all-glass systems, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For all-glass systems to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project, minimum two years documented experience.
- B. 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.

- C. Source Limitations: Obtain all-glass entrance door and partition system and components from a single firm specializing in fabrication of all-glass entrance and partition systems, with not less than 3 projects of similar scope within the past 5 years.

1.8 MOCKUPS

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Packaging of components shall be so selected to protect the components from damage during shipping and handling.
- B. Storage on Site: Store all-glass entrance and partition components in a location and in a manner to avoid damage to the components. Keep handling on site to a minimum. Exercise particular care to avoid damage to finishes of metals and glass edges.

1.10 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of supporting structure by field measurements before fabrication so that the all-glass entrance and partition work will be accurately designed, fabricated and fitted to the structure. Indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Sequencing and Scheduling: Coordinate all-glass entrance and partition Work with contiguous Work and provide components at proper time and sequence to avoid delays in overall Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of all-glass entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Provide tempered or laminated safety glass for locations subject to human impact as required by the governing codes, rules, and regulations of the authority having jurisdiction.

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- C. Structural Loads:
 - 1. Structural Live Loads: Glass door and partition system to be designed to withstand live loads in accordance with governing local, state, and federal codes, rules, and regulations of the authority having jurisdiction.
 - 2. Deflection Limits: Deflection normal to glazing plane is limited to 1/175 of clear span or 3/4 inch, whichever is smaller, except limit deflection of glass to 1/2 inch.
- D. Seismic Performance: All-glass entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- E. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- F. Building Frame Movement: Design, fabricate, and install all-glass entrances and storefronts to withstand building movements including loading deflections, shrinkage, creep, and similar movements.

2.2 METAL COMPONENTS

- A. Fitting Configuration:
 - 1. Manual-Swinging, All-Glass Entrance Doors Sidelights and Transoms: Patch fitting at top and continuous rail fitting at bottom as indicated on Drawings.
 - 2. All-Glass Partitions: Recessed glazing channel at top and continuous rail fitting at bottom as indicated on Drawings.
- B. Patch Fittings: Bronze-clad aluminum.
- C. Rail Fittings:
 - 1. Material: Match patch-fitting metal and finish,] Bronze-clad aluminum.
 - 2. Height:
 - a. Top Patch as indicated.
 - b. Bottom Rail: 10 inches as indicated.
 - 3. Profile: Square, unless indicated otherwise.
 - 4. End Caps: Manufacturer's standard precision-fit end caps for rail fittings with matching finish.
- D. Accessory Fittings: Match patch- and rail-fitting metal and finish.
- E. Anchors and Fastenings: Concealed.
- F. Materials:
 - 1. Aluminum: ASTM B 221, with strength and durability characteristics of not less than Alloy 6063-T5.
 - a. Color: As selected by Architect from full range of industry colors and color densities.

2. Bronze Cladding: ASTM B 36/B 36M, alloy as standard with manufacturer.
3. Finish: As selected by Architect from full range of industry finishes.

2.3 GLASS

- A. Glass: Class 1 (clear), ASTM C 1048, Kind FT (fully tempered), Low-Iron, Condition A (uncoated surfaces), Type I (transparent), tested for surface and edge compression per ASTM C 1048 and for impact strength per 16 CFR 1201 for Category II materials.
 1. Glass type locations as indicated in Drawings.
 2. Glass thickness as recommended by GANA, for doors and partitions in heights indicated in Drawings.
 3. Temper glass using horizontal roller process.
 4. Exposed Edges: Machine ground and flat polished.
 5. Butt Edges: Flat ground.
 6. Corner Edges: Lap-joint corners with exposed edges polished.

2.4 ENTRANCE DOOR HARDWARE

- A. General: Heavy-duty entrance door hardware units in sizes, quantities, and types recommended by manufacturer for all-glass entrance systems indicated. For exposed parts, match metal and finish of patch fittings and rail fittings. If finishes are not specified,
- B. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion.
 - b. Accessible Interior Swinging Doors: Not more than 5 lbf to fully open door.
- C. Hardware Set 1: Floating Header: At door as indicated on Drawings.
 1. Floating Header: At transom above door as indicated on Drawings.
 - a. Basis of Design manufactured by CRL, model no. NFH4BSS.
 - b. Finish: As selected by Architect.
 2. Top Patches: Basis of Design manufactured by CASMA, model no. 42410.
 - a. Finish: As selected by Architect.
 3. Bottom Rail: As indicated on Drawings.
 - a. Square, Basis of Design manufactured by Doralco.
 - b. Finish: As selected by Architect.
 4. Hinges/Pivot: Size and configuration as indicated and as recommended by manufacturer for proper performance, operation and application.
 - a. Walking Beam Pivot, Basis of Design manufactured by Dorma, model 8062.
 5. Closer and Pulls: As recommended by manufacturer for size of door and application in consideration of details indicated. Provide manufacturer's accessory components as required for a complete installation.
 - a. Floor Closer, Basis of Design manufactured by Dorma, model no. BTS80.
 - b. Swing: Single acting.

- c. Pull Hardware: Back to Back Pulls, Basis of Design manufactured by Rockwood, model no. RM3301 at 96 inches with mid post.
 - i. Finish: As selected by Architect.
- 6. Stops:
 - a. Door Header Stop: Basis of Design, manufactured by Dorma, manufacturer's standard 3 inch.
 - i. Finish: As selected by Architect.
 - b. Wall Stop: Basis of Design manufactured by Rockwood, model no. 403.
 - i. Finish: As selected by Architect.
- 7. Single-Door Lockset:
 - a. Rail Lock Set: Basis of Design manufactured by Ryadon, model no. LL01
 - i. Finish: As selected by Architect.
- 8. Cylinders: Confirm requirements with Owner.

2.5 GLAZING ACCESSORIES

- A. Glazing Accessories: Manufacturer's standard setting blocks, spacers, glazing adhesives and sealants suitable for glazing glass in fittings and for application indicated.
- B. Fasteners:
 - 1. Unless indicated otherwise, provide manufacturer's standard anchors and fasteners for attachment of components to structural supports and for connecting components, as recommended by manufacturer for application.
 - 2. Provide concealed fasteners, except where indicated or where shown and accepted on final Shop Drawings.

2.6 FABRICATION

- A. Provide holes and cutouts in glass to receive hardware, fittings, and accessory fittings before tempering glass. Do not cut, drill, or make other alterations to glass after tempering.
 - 1. Fully temper glass using horizontal (roller-hearth) process, and fabricate so that when glass is installed, roll-wave distortion is parallel with bottom edge of door or lite.
- B. Factory assemble components and factory install hardware and fittings to greatest extent possible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install all-glass systems and associated components according to manufacturer's written instructions.
- B. Set units level, plumb, and true to line, with uniform joints.
- C. Maintain uniform clearances between adjacent components.
- D. Lubricate hardware and other moving parts according to manufacturer's written instructions.
- E. Set, seal, and grout floor closer cases as required to suit hardware and substrate indicated.

3.3 FIELD QUALITY CONTROL

- A. Non-Conforming Work: Repair or replace non-conforming work.
 - 1. Remove and replace glass that is broken, chipped, cracked, abraded, or otherwise damaged, including natural causes, accidents, and vandalism, during construction period.

3.4 ADJUSTING AND CLEANING

- A. Adjust all-glass entrance doors and hardware to produce smooth operation and tight fit at contact points and weather stripping.
 - 1. For all-glass entrance doors accessible to people with disabilities, adjust closers to provide a three-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch measured to the leading door edge.
- B. Remove excess sealant and glazing compounds and dirt from surfaces.

END OF SECTION 084126

SECTION 084213 - ALUMINUM-FRAMED ENTRANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Aluminum-framed manual-swing thermal entrance doors in locations and configurations indicated in Drawings.
- B. Related Requirements:
 - 1. Section 084126 "All-Glass Entrances and Partitions" for systems without aluminum support framing.
 - 2. Section 084413 "Glazed Aluminum Curtain Walls" for curtain wall system for coordination with aluminum-framed thermal entrance doors.

1.3 ALLOWANCES

- A. Field quality-control testing is part of testing and inspecting allowance.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
 - 3. Recycled content: Provide documentation that aluminum has a minimum of 50% mixed pre- and post-consumer recycled content with a sample document illustrating project specific-specific information that will be provided after product shipment.

- a. Once product has shipped, provide project-specific recycled content information, including:
 - i. Indicate recycled content, indicate percentage of pre- and post-consumer recycled content per unit of product.
 - ii. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
 - iii. Indicate location recovery of recycled content.
 - iv. Indicate location of manufacturing facility.
 4. Environmental Product Declaration (EPD): For each product.
 5. Environmental Product Declaration: For each product.
 6. Health Product Declaration: For each product.
 7. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
- C. Shop Drawings: For aluminum-framed entrances. Include plans, elevations, sections, full-size details, and attachments to other work.
1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 2. Include full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrances, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
 4. Include point-to-point wiring diagrams showing the following:
 - a. Power requirements for each electrically operated door hardware.
 - b. Location and types of switches, signal device, conduit sizes, and number and size of wires.
- D. Samples for Initial Selection: For units with factory-applied color finishes.
- E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- F. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
1. Joinery, including concealed welds.
 2. Anchorage.
 3. Expansion provisions.
 4. Glazing.
 5. Flashing and drainage.
- G. 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. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Energy Performance Certificates: For aluminum-framed entrances, accessories, and components, from manufacturer.
 - 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type of aluminum-framed entrances.
- D. Field quality-control reports.
- E. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Manufacturer Qualifications: A manufacturer capable of fabricating thermally broken aluminum-framed entrance doors that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports and calculations.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of thermally broken aluminum-framed door openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer and Product: Subject to meeting project requirements, Basis of Design Manufacturer and Product is Kawneer Company, Inc. 250T Insulpour Thermal Entrance.
- B. Source Limitations: Obtain all components of aluminum-framed entrance, including framing and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Structural Loads:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.
- C. Structural: Test according to ASTM E330/E330M as follows:
 - 1. When tested at positive and negative wind-load design pressures, entrance doors do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, entrance doors, 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.
- D. Air Infiltration: Test according to ASTM E283 for infiltration as follows:
 - 1. Entrance Doors:
 - a. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
- E. Water Penetration under Static Pressure: Test according to ASTM E331 as follows:
 - 1. No evidence of water penetration through fixed glazing and framing areas of entrance doors 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..
- F. Energy Performance: Certify and label energy performance according to NFRC as follows:
 - 1. Thermal Transmittance (U-factor): Fixed glazing and framing areas as a system shall have U-factor of not more than 0.36 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
 - 2. Solar Heat Gain Coefficient (SHGC): Fixed glazing and framing areas as a system shall have a SHGC of no greater than 0.26 as determined according to NFRC 200.

3. Condensation Resistance: Fixed glazing and framing areas as a system shall have an NFRC-certified condensation resistance rating of no less than 65 as determined according to NFRC 500.
- G. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for project Wind Zone for basic protection.
 1. Large-Missile Test: For glazing located within 30 feet of grade.
 2. Small-Missile Test: For glazing located between 30 feet and 60 feet above grade.
- H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.
 1. Door Construction: Nominal 0.125-inch thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - a. Thermal Construction: Manufacturer's standard thermal barrier for application.
 2. Door Design: Narrow stile; 2-1/2-inch nominal width.
 3. Glazing Stops and Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
 4. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- B. Framing Members: Manufacturer's standard extruded aluminum, alloy and temper recommended by aluminum-framed door manufacturer for strength, corrosion resistance, and application of required finish, minimum 0.125 inch thick and reinforced as required to support imposed loads.
 1. Nominal Size: As indicated on Drawings.
- 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 nonstaining, nonferrous shims for aligning system components.
- E. Materials:
 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: ASTM B209.
 - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
 - c. Extruded Structural Pipe and Tubes: ASTM B429/B429M.
 - d. Structural Profiles: ASTM B308/B308M.
 2. Steel Reinforcement:
 - a. Structural Shapes, Plates, and Bars: ASTM A36/A36M.

- b. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
 - d. 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.
3. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
 4. Regional Materials: Products shall be fabricated within 100 miles of Project site from materials that have been extracted, harvested, or recovered within 100 miles of Project site.

2.4 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."
- B. General: Provide entrance door hardware for each entrance door, to comply with requirements in this Section, and to smoothly operate, tightly close, and securely lock aluminum-framed entrance doors.
 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
 3. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbft to set the door in motion.
 - b. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- C. Designations: Requirements for design, grade, function, finish, quantity, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
 2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- D. Cylinders: As specified in Section 087100 "Door Hardware."
- E. Pivot Hinges: BHMA A156.4, Grade 1.
 1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.
- F. Butt Hinges: BHMA A156.1, Grade 1, radius corner.

1. Nonremovable Pins: Provide setscrew in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
 2. Exterior Hinges: Stainless steel, with non-removeable stainless-steel pin.
 3. Quantities:
 - a. For doors up to 87 inches high, provide three hinges per leaf.
 - b. For doors more than 87 and up to 120 inches high, provide four hinges per leaf.
- G. Continuous-Gear Hinges: BHMA A156.26.
- H. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
- I. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.
- J. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- K. Cylinders: BHMA A156.5, Grade 1.
 1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation to be furnished by Owner.
- L. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
- M. Operating Trim: BHMA A156.6.
- N. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.
- O. Concealed Overhead Holders and Stops: BHMA A156.8, Grade 1.
- P. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
- Q. Weather Stripping: Manufacturer's standard replaceable components.
 1. Compression Type: Made of ASTM D2000 molded neoprene or ASTM D2287 molded PVC.
 2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
 3. Meeting stiles on pairs of doors shall be equipped with two lines of weather-stripping utilizing wool pile with polymeric fin.
 4. Weather stripping on a single acting offset pivot or butt hung door and frame (single or pairs) shall be comprised of a thermoplastic elastomer on a tubular shape with a semi-rigid polymeric backing and a wool pile with polymeric fin.
- R. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

- S. Thresholds: BHMA A156.21 raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch, extruded aluminum, thermally broken, with ribbed surface.
- T. Finger Guards: For entrance doors with center pivots, manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.5 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.
 - 1. Sealant shall have a VOC content of 250 g/L or less.
 - 2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.6 ACCESSORIES

- A. Automatic Door Operators: Refer to Section 087100 "Door Hardware" for requirements.
- B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
- C. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.
- D. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- E. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.
- F. Rigid PVC Filler.

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. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - 1. At interior and exterior doors, provide compression weather stripping at fixed stops.
- E. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 - 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 - 2. At exterior doors, provide weather sweeps applied to door bottoms.
- F. 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.
- G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 50 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.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range to match adjacent aluminum curtain wall system in color and gloss.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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 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 glazing as specified in Section 088000 "Glazing."
- F. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

- B. Field Quality-Control Testing: Perform the following test on aluminum-framed entrances.
 - 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.
 - 2. Air Infiltration: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
 - 3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.
- C. Aluminum-framed entrances will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Clean aluminum surfaces immediately after installing aluminum-framed door and storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during the construction period.

END OF SECTION 084213

SECTION 084413 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Conventionally glazed aluminum curtain walls.
- B. Related Requirements:
 - 1. Section 078443 "Joint Firestopping" perimeter fire-containment systems (safing insulation) field installed with glazed aluminum curtain walls.
 - 2. Section 079200 "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain walls and for sealants to the extent not specified in this Section.
 - 3. Section 088000 "Glazing" for curtain wall 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.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
 - 3. Environmental Product Declaration (EPD): For each product.
 - 4. Environmental Product Declaration: For each product.
 - 5. Health Product Declaration: For each product.
 - 6. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
- C. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 2. Include full-size isometric details of each type of vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
 1. Joinery, including concealed welds.
 2. Anchorage.
 3. Expansion provisions.
 4. Glazing.
 5. Flashing and drainage.
- F. Delegated-Design Submittal: For glazed aluminum curtain walls, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data:
 1. For Installer and field testing agency.
 2. For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.
- B. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.
 1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
- C. Product Test Reports: For glazed aluminum curtain walls, for tests performed by a qualified testing agency.
- D. Field quality-control reports.
- E. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating glazed aluminum curtain walls that meet or exceed performance requirements.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- C. Testing Agency Qualifications: Qualified according to ASTM E699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025, accredited by AAMA-certified laboratory, and acceptable to Authorities Having Jurisdiction, Owner and Architect.
- D. 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 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 WARRANTY

- A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.

- b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of baked enamel, powder coat, or organic finishes within specified warranty period.
1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. 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 glazed aluminum curtain walls.
- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
1. Glazed aluminum curtain walls shall withstand movements of supporting structure, including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- C. Structural Loads:
1. Wind Loads: As indicated on Drawings.
 2. Other Design 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 1/175 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, whichever is less.

2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
 - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
 3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
 - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4-inch for spans of greater than 11 feet 8-1/4 inches or 1/175 times span, for spans of less than 11 feet 8-1/4 inches.
- E. Structural: Test according to ASTM E330/E330M 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 E283 for infiltration as follows:
1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
- G. Water Penetration under Static Pressure: Test according to ASTM E331 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 8 lbf/sq. ft..
 2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters or water that is drained to exterior.
- H. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas as a system shall have U-factor of not more than 0.36 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
 2. SHGC: Fixed glazing and framing areas as a system shall have a SHGC of no greater than 0.25 as determined according to NFRC 200.
 3. Condensation Resistance: Fixed glazing and framing areas as a system shall have an NFRC-certified condensation resistance rating of no less than 65 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, ambient; 180 deg F, material surfaces.

2.2 SOURCE LIMITATIONS

- A. Obtain all components of curtain-wall system, including framing entrances and accessories, from single manufacturer.

2.3 GLAZED ALUMINUM CURTAIN WALL SYSTEMS

- A. Manufacturers: Basis of Design manufacturer and product is Kawneer Company, Inc. 1600UT System 1 Curtain Wall, in locations and with frame depths indicated in Drawings.
 - 1. Tested to AAMA 501-05 and TAS 202.
- B. Subject to compliance with project requirements, other manufacturers who may be considered are:
 - 1. EFCO Corporation, a Pella Company.
 - 2. Oldcastle Building Envelope, Vistawall Architectural Products.
- C. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: Thermally broken.
 - 2. Glazing System: Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane: Front.
 - 4. Finish: High-performance organic finish.
 - 5. Fabrication Method: Either factory- or field-fabricated system.
 - 6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 7. Steel Reinforcement: As required by manufacturer.
- D. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.
 - 1. Include snap-on aluminum trim that conceals fasteners.
- E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- F. Finish: Match adjacent glazed aluminum curtain-wall finish.
- G. Entrance Door Systems: Comply with Section 084213 "Aluminum-Framed Entrances".

2.4 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: ASTM C509 or ASTM C864. Manufacturer's standard.
 - 1. Color: As selected by Architect from Manufacturer's standard range.
- C. Glazing Sealants: As recommended by manufacturer.
 - 1. Sealant shall have a VOC content of 250 g/L or less.

2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 MATERIALS

- A. Sheet and Plate: ASTM B209.
- B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
- 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.
- F. Steel Reinforcement 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.
- G. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- H. Regional Materials: Products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

2.6 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 2. Reinforce members as required to receive fastener threads.
 3. Where fasteners are exposed, use fasteners fabricated from series 300 stainless steel.
- B. Anchors: Manufacturer's standard three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.

- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

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. Fabricate components to resist water penetration as follows:
 - 1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
 - 2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.
- E. Curtain-Wall Framing: Fabricate components for assembly using manufacturer's standard assembly method using shear-block system.
- F. Factory-Assembled Frame Units:
 - 1. Rigidly secure nonmovement joints.
 - 2. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions, to ensure compatibility and adhesion.
 - 3. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - 4. Seal joints watertight unless otherwise indicated.
 - 5. Install glazing to comply with requirements in Section 088000 "Glazing."
- G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 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 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions.
- B. Do not install damaged components.
- C. Fit joints to produce hairline joints free of burrs and distortion.
- D. Rigidly secure nonmovement joints.
- E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- F. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
- G. Seal joints watertight unless otherwise indicated.
- H. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.

2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

I. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

J. Install components plumb and true in alignment with established lines and grades.

3.4 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 088000 "Glazing."

3.5 INSTALLATION OF WEATHERSEAL SEALANT

A. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

3.6 ERECTION TOLERANCES

A. Install glazed aluminum curtain walls to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.

2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.

3. Alignment:

a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.

b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.

c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls and mockups.

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 tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.

2. Air Infiltration: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
 - a. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.
- C. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Provide periodic site visits by manufacturer's field service representative during installation.

3.8 ADJUSTING, CLEANING, AND PROTECTION

- A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum curtain wall system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.
- B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 084413

SECTION 085673 - ACOUSTICALLY-RATED WINDOW ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2 SUMMARY

- A. Section includes acoustically-rated window assemblies.

1.3 PERFORMANCE REQUIREMENTS

- A. Acoustically-rated window assemblies shall have a laboratory Sound Transmission Class (STC) rating that meets or exceeds STC-35.

1.4 SUBMITTALS

- A. Shop Drawings: Prior to fabrication, submit drawings showing complete details including all dimensions, materials, finishes, mounting hardware, seals, blocking and other pertinent information as may be required.
- B. Samples: Submit sample of metal frame, in finish selected by Architect from manufacturer's standards.
- C. Certified test reports indicating the acoustical performance of the window meets the Sound Transmission Class (STC) performance called out in the schedule or drawings. Test data shall be produced from an accredited independent acoustical laboratory. Reports should indicate that the test was performed on the window assembly of the type to be supplied in conformance with the requirements of test method ASTM E90-75,81,85,87 (or most current year of test methodology). Test data shall indicate type of hardware used on the window. Manufacturer shall indicate whether additional treatment of the window frame, by the insertion of grout or high density glass/mineral fiber in the cavity between frame and wall, shall be necessary to meet the acoustical requirements of this specification. Acoustical consultant shall be the judge of technical acceptability of these data.
- D. Written warranty that the window is constructed in accordance with the laboratory tested window and free of defects in material and workmanship for a period of one year after installation.

PART 2 - PRODUCTS

2.1 BASIS OF DESIGN MANUFACTURERS

- A. Subject to compliance with requirements, available manufacturers offering products serving as basis of design that may be incorporated into the Work include, but are not limited to, the following:

1. Mon-Ray, Inc. Minneapolis, MN.
2. Wausau Window and Wall Systems, Wausau, WI.
3. Peerless Products, Inc., Shawnee Mission, KS.
4. St. Cloud Window, Inc., St. Cloud, MN.

2.2 DESCRIPTION OF ACOUSTICALLY-RATED WINDOW ASSEMBLY

- A. Glass assembly:
1. Window Type for Projection Port
 - a. Laminated glass consisting of 1/4" thick lead free optically clear glass ply, 0.030" interlayer, and 1/4" thick lead free optically clear glass ply (1/2" nominal overall thickness).
 - b. Fixed assembly, installed at angled plane per Drawings.
 2. Window Type for Control Room View
 - a. Laminated glass shall be minimum 1/4" thick laminated glass or as required to meet STC rating.
 - b. Single horizontal sliding window, installed in vertical plane per Drawings.
 - c. Subject to compliance with requirements, Basis of Design Products include:
 - i. Series 450 by Mon-Ray, Inc.
 - ii. Series 9530, 9535, or 9540 by Peerless Products, Inc.
 - iii. Horizontal Sliding Window #940 by St. Cloud Window, Inc.
 - iv. Series 4100IHS by Wausau Windows.
- B. Acoustically-Rated Window Assemblies shall be complete, window and frame assemblies that will meet or exceed the scheduled performance and STC rating indicated.
- C. Single glazed acoustical window shall be factory glazed and sealed. Window system shall include: glass, aluminum framing and trim, sound deadening treatments, desiccants and all accessory items as shown on the drawings and required for a complete installation, including caulking and anchorage to adjacent construction.
- D. Side-parting, single track, horizontal sliding window shall have meeting rails that interlock when closed. All perimeter, intermediate and center stile interfaces shall be sealed with pile or neoprene weather-stripping. Sash shall be removable to the inside for cleaning.
- E. Frames shall be identical to that of the acoustically tested unit. Frame shall be free of defects impairing strength and durability.
- F. Window assemblies shall be as noted, with metal frame, finish as selected by Architect from manufacturer's standard finishes.
- G. Refer to Drawings for acoustically-rated window locations, details, and dimensions.
- H. The glazing shall be as necessary to achieve the specified transmission loss performance and visual clarity requirements for function.

- I. Basis of Design glazing manufacturer for lead-free optically clear glazing: Schott North America.
 1. Additional Manufacturers and Products that may be considered if they meet or exceed the scheduled performance:
 - a. PPG, Starphire.
 - b. Pilkington, Optiwhite.

2.3 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 1. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
 2. Construction: Laminate glass with polyvinyl butyral interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations.
 3. Interlayer Thickness: Provide thickness not less than needed to comply with requirements.
 4. Interlayer Color: Clear.

2.4 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, shape and strength complying with applications indicated and with a proven record of compatibility with surfaces contacted in installation.
- B. Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain seal to comply with requirements.
- C. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- D. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- E. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- F. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.5 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer, to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surrounding construction for compliance with requirements for installation. Notify architect of any discrepancies. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ADJUSTMENT OF ASSEMBLY:

- A. Adjustment of frame and acoustic gaskets shall take place to ensure proper fit, and performance.

3.3 INSTALLATION

- A. Install assemblies as indicated on the Contract Documents, square, level and in their proper elevation, plane and location. All work shall be complete in every detail, and the finished work shall be clean and adjusted for the Architect prior to final acceptance.
- B. Acoustical windows shall be installed under direct supervision of the manufacturer or their representative using skilled mechanics. Anchorage to the building structure shall be in accordance with approved Shop Drawings.
- C. Caulking: The perimeter of each window shall be caulked on both sides. The caulking shall be performed as a part of this work to insure overall performance of the window system.

3.4 DEMONSTRATION

- A. Demonstrate the maintenance of the windows to the Owner's designated representative.

END OF SECTION 085673

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. Automatic operators.
 - 4. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 01 Section “Cash Allowances”.
 - 2. Division 08 Section “Hollow Metal Doors and Frames”.
 - 3. Division 08 Section “Flush Wood Doors”.
 - 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. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

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 Submittals.

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. 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.

- C. 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.
- D. Automatic Operator Supplier Qualifications: Power operator products and accessories are required to be supplied and installed through current members of the manufacturer's "Power Operator Preferred Installer" program. Suppliers are to be factory trained, certified, and a direct purchaser of the specified power operators and be responsible for the installation and maintenance of the units and accessories indicated for the Project.
- 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 Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. 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. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Ten years for mortise locks and latches.
 - 2. Five years for exit hardware.
 - 3. Twenty five years for manual surface door closer bodies.
 - 4. Ten years for heavy duty floor closers.
 - 5. Five years for motorized electric latch retraction exit devices.
 - 6. Two years for electromechanical door hardware.

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 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. 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: 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. Bommer Industries (BO).
 - b. Lawrence Brothers (LA).
 - c. McKinney Products (MK).
- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 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. Bommer Industries (BO).
 - b. Pemko Products (PE).
 - c. Select Products (SE).

C. Floor Closers: ANSI/BHMA A156.4 certified floor closers. Provide independent and adjustable valves for closing speed, latch speed, and backcheck with built-in dead stop and hold open features as specified. Provide finished cover plates or thresholds as indicated in door Hardware Sets.

1. Manufacturers:
 - a. C.R. Lawrence (LW).
 - b. Jackson Corporation (JA).
 - c. Rixson Door Controls (RF).

D. Pivots: ANSI/BHMA A156.4, Grade 1, certified. Space intermediate pivots equally not less than 25 inches on center apart or not more than 35 inches on center for doors over 121 inches high. Pivot hinges to have oil impregnated bronze bearing in the top pivot and a radial roller and thrust bearing in the bottom pivot with the bottom pivot designed to carry the full weight of the door. Pivots to be UL listed for windstorm where applicable.

1. Manufacturers:
 - a. Accurate Lock and Hardware (AC).
 - b. Architectural Builders Hardware (AH).
 - c. Rixson Door Controls (RF).

2.3 POWER TRANSFER DEVICES

A. 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. Architectural Builders Hardware (AH) - PT1000-EZ Series.
 - b. Pemko Products (PE) - EL-CEPT Series.
 - c. Securitron (SU) - EL-CEPT Series.

- B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
 - a. McKinney Products (MK) - Electrical Connecting Kit: QC-R001.
 - b. McKinney Products (MK) - Connector Hand Tool: QC-R003.
2. Manufacturers:
 - a. McKinney Products (MK) - QC-C Series.

2.4 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
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. Door Controls International (DC).
 - b. Rockwood Products (RO).
 - c. Trimco (TC).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls 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. 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.
 3. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.

4. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood Products (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. Source Limitations: Obtain each type of temporary keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
 1. Manufacturers:
 - a. Corbin Russwin Hardware (RU).
 - b. Sargent Manufacturing (SA).
 - c. Yale Locks and Hardware (YA).
- C. Cylinders: Original manufacturer cylinders complying with the following:
 1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
 4. 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.
 5. Keyway: Match Facility Standard.
- D. Permanent Cores: Match standard. Reference Division 01 "Cash Allowances" for material required under project. Installation to be included under Division 08 "Door Hardware" base bid package.
 1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- E. Keying System: Each type of lock and cylinders to be factory keyed.
 1. Conduct specified "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: Three (3) each.
 2. Master Keys (per Master Key Level/Group): Five (5) each.
 3. Construction Keys: Ten (10) each.
 4. Construction Control Keys: Two (2) each.
 5. Permanent Control Keys: Two (2) each.
- G. Construction Keying: Provide temporary keyed brass 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.
- I. 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).
- J. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into "Key Wizard" software.

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML2000 Series.
 - b. Sargent Manufacturing (SA) - 8200 Series.
 - c. Yale Locks and Hardware (YA) - 8800FL Series.

2.7 ELECTROMECHANICAL LOCKING DEVICES

- A. Electromechanical Mortise Locksets, Grade 1 (Heavy Duty): Subject to same compliance standards and requirements as mechanical mortise locksets, electrified locksets to be of type and design as specified below.
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. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML20900 Series.
 - b. Sargent Manufacturing (SA) - 8200 Series.
 - c. Yale Locks and Hardware (YA) - 8800FL Series.

2.8 AUXILIARY LOCKS

- A. Cylindrical Deadlocks: ANSI/BHMA A156.36, Grade 1, cylindrical type deadlocks to fit standard ANSI 161 preparation and 1 3/8" to 1 3/4" thickness doors. Provide tapered collars to resist vandalism and 1" throw solid steel bolt with hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other locksets.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DL3200 Series.
 - b. Sargent Manufacturing (SA) - 480 Series.
 - c. Yale Locks and Hardware (YA) - D100 Series.

2.9 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
- B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 2. Strikes for Auxiliary Deadlocks: BHMA A156.36.
 3. Dustproof Strikes: BHMA A156.16.

2.10 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
1. 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. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.
 7. 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.
 8. 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.
 9. 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.
 10. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.

11. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 12. Extended cycle test: Devices to have been cycle tested in ordinance with ANSI/BHMA 156.3 requirements to 9 million cycles.
 13. Rail Sizing: Provide exit device rails factory sized for proper door width application.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified 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.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ED4000/ED5000 Series.
 - b. Sargent Manufacturing (SA) - 80 Series.
 - c. Yale Locks and Hardware (YA) - 7000 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 including installation and adjusting information on inside of cover.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

- B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 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. Norton Door Controls (NO) – 9500 Series.
- c. Sargent Manufacturing (SA) - 281 Series.

- C. Door Closers, Surface Mounted (Cam Action): ANSI/BHMA 156.4, Grade 1 certified surface mounted, high efficiency 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 of the cam and roller design, one piece cast aluminum silicon alloy body with adjustable backcheck and independently controlled valves for closing sweep and latch speed.

1. Manufacturers:

- a. Corbin Russwin (RU) - DC5000 Series.
- b. Norton Door Controls (NO) - 2800ST Series.
- c. Sargent Manufacturing (SA) - 422 Series.

- D. Door Closers, Overhead Concealed (Narrow Profile): ANSI/BHMA 156.4 certified Grade 1 door closers designed for narrow profile frames and doors. Closers to have fully concealed body in the frame head for offset hung applications, with separate and independent valves for closing speed and backcheck adjustments.

1. Manufacturers:

- a. Jackson Corporation (JA) - Series.
- b. LCN Closers (LC) - 2030 Series.
- c. Rixson Door Controls (RF) - 91 Series.

2.12 AUTOMATIC DOOR OPENERS

- A. General: Provide low energy operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.

1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

- B. Standard: Certified ANSI/BHMA A156.19.

- C. Performance Requirements:

1. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
 2. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.
- D. Configuration: Surface mounted or in-ground as required. Door operators to control single swinging and pair of swinging doors.
- E. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19. When not in automatic mode, door operator to function as manual door closer with fully adjustable opening and closing forces, with or without electrical power.
- F. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.
- G. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.
- H. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.
- I. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Norton Door Controls (NO) – 6000-LS Series.
- 2.13 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 certified 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. Hiawatha, Inc. (HI).
 - b. Rockwood Products (RO).
 - c. Trimco (TC).

2.14 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 certified 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. Hiawatha, Inc. (HI).
 - b. Rockwood Products (RO).
 - c. Trimco (TC).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified 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. Rixson Door Controls (RF).
 - b. Rockwood Products (RO).
 - c. Sargent Manufacturing (SA).

2.15 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 Products (PE).
 - 3. Reese Enterprises, Inc. (RE).

2.16 ELECTRONIC ACCESSORIES

- A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
 - 1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 3280 Series.
 - b. Security Door Controls (SD) - DPS Series.
 - c. Securitron (SU) - DPS Series.

- B. Switching Power Supplies: Provide switching power supplies that are dual voltage, UL listed, supervised units. Units shall be field selectable with a dedicated battery charging circuit that provide 4 Amp at 12VDC or 24VDC continuous, with up to 16 independently controlled power limited outputs. Units shall tolerate brownout or overvoltage input $\pm 15\%$ of nominal voltage and have thermal shutdown protection with auto restart. Circuit breaker shall protect against overcurrent and reverse battery faults and units shall be available with a single relay fire trigger or individually triggered relayed outputs. 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.

- 1. Manufacturers:

- a. Securitron (SU) - AQ Series.

2.17 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.

2.18 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.

2.19 EXISTING HARDWARE

- A. All hardware for doors listed as existing to remain in the door schedule or in the hardware sets will remain. The general contractor shall clean and adjust these items for proper alignment and operation.

2.20 EXISTING HARDWARE PREPS

- A. The general contractor shall verify that all new hardware specified for existing doors and frames will be compatible with the existing hardware preparations. Lack of verification prior to bid, that requires additional work to the existing doors and frames or additional material, will be the responsibility of the general contractor.

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. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 - 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. Power Operator products and accessories are required to be installed through current members of the manufacturer's "Power Operator Preferred Installer" program.

- D. 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.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

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.
- B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

Set: 1 – Entry Vestibule

Doors: 800

2 Floor Closer	28NHO x 90 deg x less floor plate	613E	RF
2 Angle Stop	60131	613E	RF
2 Push/Pull	(2) RM2300 x 96" x MP x Type 13HD mounting	US10BE	RO
1 Automatic Door Opener	6061-LS x 120VAC	690	NO
1 Bollard Post & Switch	500 x 125VAC	689	NO
1 Door Position Switch	505 x 125VAC		NO
1 Threshold	Type 1 x 700 x DOW x 1/4-20 ms & la	BZ	RF
2 Door Bottom Seal	321 DN x DOW		PE

Gasketing and astragal furnished by frame manufacturer

Set: 1.1 – Entry Vestibule

Doors: 801.2

1 Floor Closer	28NHO x 90 deg x less floor plate	613E	RF
1 Angle Stop	60131	613E	RF
1 Push/Pull	(2) RM2300 x 96" x MP x Type 13HD mounting	US10BE	RO
1 Threshold	Type 1 x 700 x DOW x 1/4-20 ms & la	BZ	RF
1 Door Bottom Seal	321 DN x DOW		PE

Gasketing furnished by frame manufacturer

Set: 1.2 – Exterior Entry

Doors: 801

2	Floor Closer	27NHO x 90 deg x SC x less floor plate	613E	RF
4	Intermediate Pivot	M19	613E	RF
1	Exit Device	EX76-M x less cylinder x 2" thick door	313	AD
1	Rim Cylinder	CR3040 x temporary core x CMK	613E	RU
1	Permanent Core	To match facility standard x MK	606	OT
1	Exit Device	EX76-M x 2" thick door	313	AD
2	Pull	RM2300 x 96" x MP x Type 12HD mounting x 2" thick door	US10BE	RO
2	Overhead Stop	1-X36 x 90 deg	613E	RF
1	Threshold	Type 5 x 400 x DOW x 1/4-20 ms & la	BZ	RF
2	Door Bottom Seal	345 DV x DOW		PE
1	Astragal (Set)	(2) 297 DS x DOH		PE
1	Drip Strip	346 D x DOW + 4"		PE
2	Door Position Switch	DPS-M-BK		SU

Gasketing furnished by frame manufacturer

Set: 1.3 – Exterior Entry

Doors: 801.1

1	Floor Closer	27NHO x 90 deg x SC x less floor plate	613E	RF
2	Intermediate Pivot	M19	613E	RF
1	Exit Device	EX89-M x less cylinder x 2" thick door	313	AD
1	Rim Cylinder	CR3040 x temporary core x CMK	613E	RU
1	Permanent Core	To match facility standard x MK	606	OT
1	Electric Strike	9600 x 2004 x 24VD	613	HS
1	ElectroLynx Harness	QC-C1500P		MK
	<i>(Install between electric strike and junction box)</i>			
1	Pull	RM2300 x 96" x MP x Type 12HD mounting x 2" thick door	US10BE	RO
1	Automatic Door Opener	6061-LS x 120VAC	690	NO
2	Bollard Post & Switch	500 x 125VAC	689	NO
1	Overhead Stop	1-X36 x 90 deg	613E	RF
1	Threshold	Type 5 x 400 x DOW x 1/4-20 ms & la	BZ	RF
1	Door Bottom Seal	345 DV x DOW		PE
1	Drip Strip	346 D x DOW + 4"		PE
1	Card Reader	Furnished and installed by security contractor		OT
1	Door Position Switch	DPS-M-BK		SU
1	Power Supply	AQD4		SU
1	Wiring Diagram	WD-SYSPK		RU

Gasketing furnished by frame manufacturer

Card reader to be used by authorized persons to gain entry from the exterior side of the opening

Card reader to be used to activate the electric strike and allow for use of the exterior press wall switch
 Push side press wall switch to activate the electric strike and then activate the automatic door operator at all times
 Push bar of exit device always free for immediate egress

Set: 2 – Meeting

Doors: 802, 803, 803.1, 804, 804.1

4 Concealed Hinge	MK100	Black	MK
1 Exit Device	EX89-R-3080-3-MB x less cylinder	313	AD
1 Mortise Cylinder	CR1040 x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Mounting Bracket	BKT075SP		PE
1 Overhead Concealed Closer	91H x 90 deg	613E	RF
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	7770 D x DOW x DOH		ZE
1 Automatic Door Bottom	434 APKL x DOW		PE

Set: 3 – Folding Partition/Overhead Roll-up/Sliding Door

Doors: 802.1, 803.2, 809, 820, 842.2, 842.4, 853.1, 854.2

All hardware furnished by door manufacturer

Set: 4 – Storage

Doors: 802A, 802B, 803A, 803B, 804A

2 Pivot (Set)	147	613E	RF
4 Intermediate Pivot	M19	613E	RF
2 Angle Stop	60131	613E	RF
1 Deadlock	DL3013 x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
2 Flush Pull	94C	US10BE	RO
1 Flush Bolt (Top)	555 x 24"	US10BE	RO
1 Flush Bolt	555 x 12"	US10BE	RO
1 Dust Proof Strike	570	US10BE	RO
2 Armor Plate	K1050 16" x 1" LDW 4BE CSK	US10BE	RO
2 Overhead Stop	1-X36 x 90 deg	613E	RF

Wood astragal furnished by door manufacturer

Set: 5 – Meeting

Doors: 805.1

8 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	US10BE	MK
1 Exit Device	ED5470 x 106955ET x temporary core x M52 x M55 x M110 x CMK	613E	RU
1 Exit Device	ED5470 x 106950ET x temporary core x M52 x M55 x M110 x CMK	613E	RU
2 Mounting Bracket	BKT075SP		PE
3 Permanent Core	To match facility standard x MK	606	OT
2 Closer/Holder	DC8210 A12	690	RU
2 Mounting Bracket	BKT075SP		PE
2 Kickplate	K1050 10" x 1" LDW 4BE CSK	US10BE	RO

STC rated assembly-threshold, sound seal, automatic door bottoms and astragal furnished by door manufacturer

Set: 6 – Exterior Corridor

Doors: 806.1

1 Pivot (Set)	147	613E	RF
2 Intermediate Pivot	M19	613E	RF
1 Exit Device	EX89-M x less cylinder	313	AD
1 Rim Cylinder	CR3040 x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Pull	RM2300 x 96" x MP x Type 12HD mounting x 2" thick door	US10BE	RO
1 Closer	DC8210 A3 x M77	690	RU
1 Mounting Plate	754F25	690	RU
1 Overhead Stop	1-X36 x 90 deg	613E	RF
1 Threshold	170 B x DOW x MS & ES25		PE
1 Door Bottom Seal	345 DV x DOW		PE
1 Drip Strip	346 D x DOW + 4"		PE
1 Door Position Switch	DPS-M-BK		SU

Gasketing furnished by frame manufacturer

Set: 7 – Exterior Corridor

Doors: 806.2

2 Continuous Hinge	DFM95HD1		PE
1 Power Transfer <i>(For active leaf of pair only)</i>	EL-CEPT	US10B	SU
1 ElectroLynx Harness <i>(Install between power transfer and junction box)</i>	QC-C1500P		MK

1	Electric Latch Retraction Exit Device (Fail Secure)	ED5200A x 106957ET x temporary core x M52 x MELR x M110 x CMK x 24VDC	613E	RU
1	ElectroLynx Harness <i>(Install between power transfer and electric latch retraction exit device)</i>	QC-CXXX x required length		MK
1	Exit Device	ED5200A x temporary core x M52 x M110	630	RU
1	Removable Mullion <i>(Removable mullion to be cut to size in the field)</i>	CR908BKM x 96" x temporary core x		RU
2	Permanent Core	To match facility standard x MK	606	OT
1	Automatic Door Operator <i>(For active leaf of pair only)</i>	6061 x 120VAC	690	NO
2	Press Wall Switch	505 x 125VAC		NO
1	Closer	DC6210 A13	690	RU
2	Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
2	Overhead Stop	9-X36 x 90 deg	613E	RF
1	Threshold <i>(Threshold to be notched for removable mullion in the field)</i>	171 B x DOW x MS & ES25		PE
1	Gasketing (Set)	316 DS x DOW x DOH		PE
1	Mullion Door Seal	5110 BL x DOH		PE
2	Door Bottom Seal	345 DV x DOW		PE
1	Drip Strip	346 D x DOW + 4"		PE
1	Card Reader	Furnished and installed by security contractor		OT
2	Door Position Switch	DPS-M-BK		SU
1	Power Supply	ADQ4		SU
1	Wiring Diagram	WD-SYSPK		RU

Card reader to be used by authorized persons to gain entry from the exterior side of the opening
 Card reader to be used to retract the latch of the electric latch retraction exit device and allow for
 use of the exterior press wall switch
 Push side press wall switch to retract the latch of the electric latch retraction exit device and then
 activate the automatic door operator at all times
 Push bar of exit devices always free for immediate egress

Set: 8 – Box Office/Coats/Concessions

Doors: 806A, 810, 811

4	Hinge	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1	Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1	Permanent Core	To match facility standard x MK	606	OT
1	Overhead Concealed Closer	91N x 90 deg	613E	RF
1	Mop Plate <i>(For door 806A only)</i>	K1050 4" x 1" LDW 4BE CSK	US10BE	RO
1	Wall Stop	406	US10BE	RO
1	Door Stop <i>(For door 810 only)</i>	481	US10BE	RO
3	Silencer <i>(Furnish at wood frame only)</i>	609		RO

Set: 9 – Box Office/Closet

Doors: 806B, 811.1

4 Hinge	TA2714 4-1/2" x 4-1/2" NRP	US10BE	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Mop Plate	K1050 4" x 1" LDW 4BE CSK	US10BE	RO
<i>(For door 806B only)</i>			
1 Wall Stop	406	US10BE	RO
1 Overhead Stop	9-X36 x 90 deg	613E	RF
<i>(For door 806B only)</i>			
3 Silencer	608-RKW		RO
<i>(Furnish at hollow metal frame only)</i>			

Set: 10 – Catering

Doors: 807

4 Hinge	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Office Lockset	ML2051 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer/Holder	DC8200 A1	690	RU
1 Mop Plate	K1050 4" x 1" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO
3 Silencer	608-RKW		RO

Set: 11 – Catering

Doors: 807.1

8 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Office Lockset	ML2051 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Flush Bolt (Top)	555 x 24"	US10BE	RO
1 Flush Bolt	555 x 12"	US10BE	RO
1 Dust Proof Strike	570	US10BE	RO
1 Closer	DC8200	690	RU
<i>(For active leaf of pair only)</i>			
2 Kickplate	K1050 10" x 1" LDW 4BE CSK	US10BE	RO
2 Mop Plate	K1050 4" x 1" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO
1 Overhead Stop	1-X36 x 90 deg	613E	RF
<i>(For active leaf of pair only)</i>			
2 Silencer	608-RKW		RO
1 Astragal	355 DS x DOH		PE

Set: 12 – Green Room

Doors: 808, 808.1

4 Hinge	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Classroom Lockset	ML2055 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8200	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO
3 Silencer	608-RKW		RO

Set: 13 – Audience Chamber/SLL

Doors: 809.1, 840

8 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	US10BE	MK
2 Push/Pull	(2) RM2300 x 84" x MP x Type 5HD mounting	US10BE	RO
2 Overhead Concealed Closer	91N x 90 deg	613E	RF
2 Kickplate	K1050 10" x 1" LDW 4BE CSK	US10BE	RO
2 Door Stop & Holder <i>(Install at top of door-both leaves)</i>	494R	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set) <i>(Furnish at hollow metal frame only)</i>	322 DSN x DOW x DOH		PE
2 Automatic Door Bottom	434 APKL x DOW		PE
1 Astragal (Set)	(2) 354 DPK x DOH		PE

Set: 14 – Group Toilet

Doors: 812, 814

4 Hinge	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Push Plate	70C 4 x 16	US10BE	RO
1 Pull	RM720 x 12" x Type 8 mounting	US10BE	RO
1 Closer	DC5230	690	RU
1 Mop Plate	K1050 4" x 1" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO

Set: 15 – Corridor Toilet

Doors: 813, 855

4 Hinge	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Privacy Set & Indicator	ML2060 106X x M19V	613E	RU
1 Closer	DC5230	690	RU
1 Mop Plate	K1050 4" x 1" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO

1 Door Stop (For door 813 only)	481	US10BE	RO
3 Silencer (Furnish at hollow metal frame only)	608-RKW		RO

Set: 15.1 – Corridor Toilet

Doors: 856.1

4 Hinge	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Privacy Set & Indicator	ML2060 106X x M19V	613E	RU
1 Closer/Stop	DC8210 A11	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Mop Plate	K1050 4" x 1" LDW 4BE CSK	US10BE	RO
3 Silencer	608-RKW		RO

Set: 16 – Copy

Doors: 821

4 Hinge	TA2714 4-1/2" x 4-1/2"	US10BE	MK
1 Office Lockset	ML2051 106X x temporary core x CMK	613E	RU
1 Wall Stop	406	US10BE	RO
3 Silencer	608-RKW		RO

Set: 17 – Office

Doors: 822

8 Hinge	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Office Lockset	ML2051 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Flush Bolt (Top)	555 x 24"	US10BE	RO
1 Flush Bolt	555 x 12"	US10BE	RO
2 Wall Stop	406	US10BE	RO

STC rated assembly-threshold, sound seal, automatic door bottoms and astragal furnished by door manufacturer

Set: 18 – Office

Doors: 823, 824, 825

4 Hinge	TA2714 4-1/2" x 4-1/2"	US10BE	MK
1 Office Lockset	ML2051 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Wall Stop	406	US10BE	RO
1 Door Stop (For door 823 only)	481	US10BE	RO

1 Gasketing (Set) S88 BL x DOW x DOH PE

Set: 19 – Piano Lab

Doors: 830

4 Hinge	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Security Classroom Lockset	ML2052 106X x temporary core x CMK	613E	RU
2 Permanent Core	To match facility standard x MK	606	OT
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Automatic Door Bottom	434 APKL x DOW		PE

Sound seal furnished by frame manufacturer

Set: 20 – Exterior Corridor

Doors: 831

1 Continuous Hinge	DFM97HD1		PE
1 Exit Device	ED5200 x 106957ET x temporary core x M52 x W048 x M110 x CMK	613E	RU
2 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8210 A13	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Overhead Stop	9-X36 x 90 deg	613E	RF
1 Threshold	1715 D x DOW x MS & ES25		PE
1 Gasketing (Set)	316 DS x DOW x DOH		PE
1 Door Bottom Seal	345 DV x DOW		PE
1 Drip Strip	346 D x DOW + 4"		PE
1 Door Position Switch	DPS-M-BK		SU

Set: 21 – Utility

Doors: 831A, 831A.1

8 Hinge	TA2714 4-1/2" x 4-1/2" NRP	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Flush Bolt (Top)	555 x 24"	US10BE	RO
1 Flush Bolt	555 x 12"	US10BE	RO
1 Dust Proof Strike	570	US10BE	RO
1 Closer/Stop	DC8210 A11	690	RU
1 Overhead Stop	9-X36 x 90 deg	613E	RF
2 Silencer	608-RKW		RO

Flat metal astragal furnished by door manufacturer

Set: 22 – Corridor/Orchestra Pit Access

Doors: 841A, 850A

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	USP	MK
1 Classroom Lockset	ML2055 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8210 A3	690	RU
<i>(For door 841A only)</i>			
1 Closer/Stop	DC8210 A11	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO
<i>(For door 841A only)</i>			
3 Silencer	608-RKW		RO

Set: 23 – Mechanical Room

Doors: 837

4 Hinge	T4A3786 5" x 4-1/2"	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8200	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO

STC rated assembly-threshold, sound seal and automatic door bottom furnished by door manufacturer

Set: 24 – Audience Chamber

Doors: 840.1, 843.1

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	US10BE	MK
1 Exit Device	ED5200 x 106910ET x temporary core x M52 x M110 x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Overhead Concealed Closer	91N x 90 deg	613E	RF
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO
<i>(For door 843.1 only)</i>			
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 DSN x DOW x DOH		PE
1 Automatic Door Bottom	434 APKL x DOW		PE

Set: 25 – Stage

Doors: 842

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	US10BE	MK
1 Classroom Lockset	ML2055 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8210 A3	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO
3 Silencer	609		RO

Set: 26 – Stage

Doors: 842.1

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	USP	MK
1 Exit Device	ED5200A x 106955ET x temporary core x M110 x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Mounting Bracket	BKT075SP		PE
1 Closer/Stop	DC8210 A11	690	RU
1 Mounting Bracket	BKT075SP		PE
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO

STC rated assembly-threshold, sound seal and automatic door bottom furnished by door manufacturer

Set: 27 – Lift/Storage

Doors: 842.3, 842.9

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer/Stop	DC8210 A11	690	RU
1 Mounting Bracket	BKT075SP		PE
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 DSN x DOW x DOH		PE
1 Automatic Door Bottom	420 APKL x DOW		PE

Set: 27.1 – Crossover/Storage

Doors: 847, 892

4 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	BSP	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8200	BSP	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO
1 Wall Stop	406	BSP	RO
1 Threshold	151 BSP x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 BSPSN x DOW x DOH		PE
1 Automatic Door Bottom	420 APKL x DOW		PE

Set: 28 – Stair

Doors: 842.5

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	USP	MK
1 Exit Device	ED5200A x 106955ET x temporary core x M110 x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Mounting Bracket	BKT075SP		PE
1 Closer/Stop	DC8210 A11	690	RU
1 Mounting Bracket	BKT075SP		PE
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 DSN x DOW x DOH		PE
1 Automatic Door Bottom	420 APKL x DOW		PE

Set: 29 – SLL

Doors: 843

4 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Exit Device	ED5200 x 106910ET x temporary core x M52 x M110 x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Mounting Bracket	BKT075SP		PE
1 Closer	DC8210 A3	690	RU
1 Mounting Bracket	BKT075SP		PE
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 DSN x DOW x DOH		PE
1 Automatic Door Bottom	420 APKL x DOW		PE

Set: 30 – Stair

Doors: 844

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	US10BE	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer/Stop	DC8210 A11	690	RU
1 Mounting Bracket	BKT075SP		PE
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 DSN x DOW x DOH		PE
1 Automatic Door Bottom	434 APKL x DOW		PE

Set: 31 – SLL

Doors: 845

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	US10BE	MK
1 Push/Pull	(2) RM2300 x 84" x MP x Type 5HD mounting	US10BE	RO
1 Overhead Concealed Closer	91N x 90 deg	613E	RF
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 DSN x DOW x DOH		PE
1 Automatic Door Bottom	434 APKL x DOW		PE

Set: 32 – Lift Vestibule

Doors: 845.1

4 Concealed Hinge	MK100	Black	MK
1 Push/Pull	(2) RM2300 x 84" x MP x Type 5HD mounting	US10BE	RO
1 Overhead Concealed Closer	91N x 90 deg	613E	RF
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	7770 D x DOW x DOH		ZE
1 Automatic Door Bottom	434 APKL x DOW		PE

Set: 33 – Crossover

Doors: 846

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8210 A3	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO

1 Wall Stop	406	US10BE	RO
1 Gasketing (Set)	S88 BL x DOW x DOH		PE

Set: 33.1 – Corridor Storage

Doors: 859, 886

4 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8200	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO
1 Gasketing (Set)	S88 BL x DOW x DOH		PE

Set: 34 – Exterior Stair

Doors: 846.1

1 Continuous Hinge	DFM87HD1		PE
1 Power Transfer	EL-CEPT	US10B	SU
1 ElectroLynx Harness	QC-C1500P		MK
	<i>(Install between power transfer and junction box)</i>		
1 Electric Latch Retraction Exit Device (Fail Secure)	ED5200A x 106957ET x temporary core x MELR x W048 x M110 x CMK x 24VDC	613E	RU
1 ElectroLynx Harness	QC-CXXX x required length		MK
	<i>(Install between power transfer and electric latch retraction exit device)</i>		
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8210 A13	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Overhead Stop	9-X36 x 90 deg	613E	RF
1 Threshold	1715 D x DOW x MS & ES25		PE
1 Gasketing (Set)	316 DS x DOW x DOH		PE
1 Door Bottom Seal	345 DV x DOW		PE
1 Drip Strip	346 D x DOW + 4"		PE
1 Card Reader	Furnished and installed by security contractor		OT
1 Door Position Switch	DPS-M-BK		SU
1 Power Supply	AQD4		SU
1 Wiring Diagram	WD-SYSPK		RU

Card reader to be used by authorized persons to gain entry from the exterior side of the opening
Card reader to be used to retract the latch of the electric latch retraction exit device
Push bar of electric latch retraction exit device always free for immediate egress

Set: 35 – Corridor

Doors: 850

8 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	US10BE	MK
1 Exit Device	ED5470 x 106955ET x temporary core x M52 x M55 x M110 x CMK	613E	RU
1 Exit Device	ED5470 x 106950ET x temporary core x M52 x M55 x M110 x CMK	613E	RU
3 Permanent Core	To match facility standard x MK	606	OT
2 Overhead Concealed Closer	91N x 90 deg	613E	RU
2 Kickplate	K1050 10" x 1" LDW 4BE CSK	US10BE	RO
2 Door Stop	481	US10BE	RO

Set: 36 – Corridor

Doors: 850.1

8 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	US10BE	MK
1 Exit Device	ED5470 x 106955ET x temporary core x M52 x M55 x M110 x CMK	613E	RU
1 Exit Device	ED5470 x 106950ET x temporary core x M52 x M55 x M110 x CMK	613E	RU
3 Permanent Core	To match facility standard x MK	606	OT
2 Mounting Bracket	BKT075SP		PE
2 Closer/Stop	DC8210 A11	690	RU
2 Mounting Bracket	BKT075SP		PE
2 Kickplate	K1050 10" x 1" LDW 4BE CSK	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
2 Automatic Door Bottom	434 APKL x DOW		PE
1 Astragal (Set)	(2) 354 DPK x DOH		PE

Sound seal furnished by frame manufacturer

Set: 37 – Loading

Doors: 854

2 Continuous Hinge	DFM95HD1		PE
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Flush Bolt (Top)	555 x 24"	US10BE	RO
1 Flush Bolt	555 x 12"	US10BE	RO
1 Dust Proof Strike	570	US10BE	RO
1 Closer	DC8200	690	RU
<i>(For active leaf of pair only)</i>			
2 Armor Plate	K1050 16" x 1" LDW 4BE CSK	US10BE	RO
2 Door Stop	481	US10BE	RO
2 Silencer	608-RKW		RO

Metal astragal furnished by door manufacturer

Set: 38 – Janitor/Storage

Doors: 851, 854C

8 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Flush Bolt (Top)	555 x 24"	US10BE	RO
1 Flush Bolt	555 x 12"	US10BE	RO
1 Dust Proof Strike	570	US10BE	RO
1 Closer	DC8200	690	RU
<i>(For active leaf of pair only)</i>			
2 Kickplate	K1050 10" x 1" LDW 4BE CSK	US10BE	RO
2 Mop Plate	K1050 4" x 1" LDW 4BE CSK	US10BE	RO
<i>(For door 854C only)</i>			
2 Door Stop	481	US10BE	RO
1 Gasketing (Set)	S88 BL x DOW x DOH		PE

Metal astragal furnished by door manufacturer

Set: 38.1 – Corridor Storage

Doors: 854D

8 Hinge	T4A3786 5" x 4-1/2" NRP	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Flush Bolt (Top)	555 x 24"	US10BE	RO
1 Flush Bolt	555 x 12"	US10BE	RO
1 Dust Proof Strike	570	US10BE	RO
1 Closer/Stop	DC8210 A11	690	RU
<i>(For active leaf of pair only)</i>			
2 Kickplate	K1050 10" x 1" LDW 4BE CSK	US10BE	RO
1 Overhead Stop	9-X36 x 90 deg	613E	RF
<i>(For inactive leaf of pair only)</i>			
1 Gasketing (Set)	S88 BL x DOW x DOH		PE

Flat metal astragal furnished by door manufacturer

Set: 39 – Dressing/Stage

Doors: 831A.4, 852, 853

4 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Classroom Lockset	ML2055 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC5230	690	RU

1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Wall Stop <i>(For door 831A.4 only)</i>	406	US10BE	RO
1 Door Stop	481	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 DSN x DOW x DOH		PE
1 Automatic Door Bottom	420 APKL x DOW		PE

Set: 40 – Exterior Loading

Doors: 854.1

1 Continuous Hinge	DFM95HD1		PE
1 Power Transfer	EL-CEPT	US10B	SU
1 ElectroLynx Harness <i>(Install between power transfer and junction box)</i>	QC-C1500P		MK
1 Electrified Lockset (Fail Secure)	ML20906-SEC x 106X x temporary core x CMK x 24VDC	613E	RU
1 ElectroLynx Harness <i>(Install between power transfer and electrified lockset)</i>	QC-CXXX x required length		MK
1 Permanent Core	To match facility standard x MK	606	OT
1 Latch Protector	321	US10BE	RO
1 Closer	DC8210 A3	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Overhead Stop	9-X36 x 90 deg	613E	RF
1 Threshold	1715 D x DOW x MS & ES25		PE
1 Gasketing (Set)	316 DS x DOW x DOH		PE
1 Door Bottom Seal	345 DV x DOW		PE
1 Drip Strip	346 D x DOW + 4"		PE
1 Card Reader	Furnished and installed by security contractor		OT
1 Door Position Switch	DPS-M-BK		SU
1 Power Supply	AQD4		SU
1 Wiring Diagram	WD-SYSPK		RU

Card reader to be used by authorized persons to gain entry from the exterior side of the opening
 Card reader to be used to unlock the pull side lever of the electrified lockset
 Push side lever of the electrified lockset always free for immediate egress

Set: 41 – Mechanical Room

Doors: 854A

8 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Surface Bolt (Top)	630 x 24"	US10BE	RO
1 Surface Bolt	630 x 12"	US10BE	RO

1 Closer/Stop <i>(For active leaf of pair only)</i>	DC8210 A11	690	RU
1 Mounting Bracket	BKT075SP		PE
2 Kickplate	K1050 10" x 1" LDW 4BE CSK	US10BE	RO
1 Overhead Stop <i>(For inactive leaf of pair only)</i>	9-X36 x 90 deg	613E	RF
1 Mounting Bracket	BKT075SP		PE

STC rated assembly-threshold, sound seal, automatic door bottoms and astragal furnished by door manufacturer

Set: 42 – Electric Room

Doors: 854B

8 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	USP	MK
1 Exit Device	ED5470B x 106957ET x temporary core x M55 x M110 x CMK	613E	RU
1 Permanent Core	To match facility standard	606	OT
1 Exit Device	ED5470B x M55 x M110	613E	RU
2 Mounting Bracket	BKT075SP		PE
2 Closer/Stop	DC8210 A11	690	RU
2 Mounting Bracket	BKT075SP		PE
2 Kickplate	K1050 10" x 1" LDW 4BE CSK	US10BE	RO

STC rated assembly-threshold, sound seal, automatic door bottoms and astragal furnished by door manufacturer

Set: 43 – Electric Room

Doors: 854B.1

4 Hinge	T4A3786 5" x 4-1/2" NRP	USP	MK
1 Exit Device	ED5200A x 106957ET x temporary core x W048 x M110 x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Mounting Bracket	BKT075SP		PE
1 Closer/Stop	DC8210 A11	690	RU
1 Mounting Bracket	BKT075SP		PE
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO

STC rated assembly-threshold, sound seal, automatic door bottoms and astragal furnished by door manufacturer

Set: 44 – Utility

Doors: 854E

4 Hinge	T4A3786 5" x 4-1/2" NRP	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer/Stop	DC8210 A11	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
3 Silencer	608-RKW		RO

Set: 45 – Toilet Stall

Doors: 856.2, 856.3, 856.4

4 Reverse Spring Hinge	1502R 4-1/2" x 4-1/2"	US10BE	MK
1 Privacy Set & Indicator	ML2060 106X x M19V	613E	RU
1 Mop Plate	K1050 4" x 1" LDW 4BE CSK	US10BE	RO
1 Wall Stop	406	US10BE	RO
3 Silencer	608-RKW		RO

Set: 46 – Dressing

Doors: 857, 858

4 Hinge	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Privacy Set & Indicator	ML2060 106X x M19V	613E	RU
1 Closer	DC5230	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Door Stop	481	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 DSN x DOW x DOH		PE
1 Automatic Door Bottom	434 APKL x DOW		PE

Set: 47 – Utility

Doors: 881, 893

4 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	BSP	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8200	BSP	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO
1 Wall Stop	406	BSP	RO
1 Door Stop	481	BSP	RO

(For door 881 only)

STC rated assembly-threshold, sound seal, automatic door bottoms and astragal furnished by door manufacturer

Set: 48 – Control

Doors: 882

4 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Classroom Lockset	ML2055 106X x temporary core x CMK	BSP	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO
1 Door Stop	481	BSP	RO

STC rated assembly-threshold, sound seal and automatic door bottom furnished by door manufacturer

Set: 49 – Lift

Doors: 883

4 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Storeroom Lockset (<i>Install cylinder on push side of door</i>)	ML2057 106X x temporary core x CMK	BSP	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer/Stop	DC8210 A11	BSP	RU
1 Mounting Bracket	BKT075SP		PE
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO
1 Threshold	151 BSP x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 BSPSN x DOW x DOH		PE
1 Automatic Door Bottom	420 APKL x DOW		PE

Set: 50 – Stair

Doors: 884

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	BSP	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8200	BSP	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO
1 Overhead Stop	1-X36 x 90 deg	BSP	RF
1 Threshold	151 BSP x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 BSPSN x DOW x DOH		PE
1 Automatic Door Bottom	420 APKL x DOW		PE

Set: 51 – Stair

Doors: 884.1, 894

4 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Passage Set	ML2010 106X	BSP	RU
1 Closer	DC5230	BSP	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO
1 Wall Stop	406	BSP	RO
1 Door Stop	481	BSP	RO
<i>(For door 894 only)</i>			
1 Threshold	151 BSP x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 BSPSN x DOW x DOH		PE
1 Automatic Door Bottom	420 APKL x DOW		PE

Set: 52 – Utility

Doors: 884A

4 Hinge	TA2714 4-1/2" x 4-1/2"	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	BSP	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8200	BSP	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO
1 Door Stop	481	BSP	RO
3 Silencer	608-RKW		RO

Set: 53 – Utility

Doors: 890C

3 Hinge	TA2714 4-1/2" x 4-1/2"	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	BSP	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8200	BSP	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO
1 Overhead Stop	1-X36 x 90 deg	BSP	RF
3 Silencer	608-RKW		RO

Set: 53.1 – Utility

Doors: 896

3 Hinge	TA2714 4-1/2" x 4-1/2" NRP	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	BSP	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer/Stop	DC8210 A11	BSP	RU
1 Mounting Bracket	BKT075SP		PE
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO

1 Threshold	151 BSP x DOW x MS & ES25	PE
1 Sound Seal (Set)	322 BSPSN x DOW x DOH	PE
1 Automatic Door Bottom	420 APKL x DOW	PE

Set: 54 – Utility

Doors: 891

3 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	BSP	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8200	BSP	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO
1 Door Stop	481	BSP	RO

STC rated assembly-threshold, sound seal and automatic door bottom furnished by door manufacturer

Set: 55 – Storage

Doors: 885A

4 Hinge	TA2714 4-1/2" x 4-1/2"	US10BE	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Door Stop	481	BSP	RO
3 Silencer	609		RO

Set: 56 – Mechanical Room

Doors: 804B

2 Pivot (Set)	147	613E	RF
4 Intermediate Pivot	M19	613E	RF
2 Angle Stop	60131	613E	RF
1 Storeroom Lockset	ML2057 106X x temporary core x less outside trim x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
2 Flush Pull	94C	US10BE	RO
1 Flush Bolt (Top)	555 x 24"	US10BE	RO
1 Flush Bolt	555 x 12"	US10BE	RO
1 Closer/Stop	DC8210 A11	690	RO
1 Mounting Bracket	BKT075SP		PE
2 Armor Plate	K1050 16" x 1" LDW 4BE CSK	US10BE	RO
1 Overhead Stop	9-X36 x 90 deg	613E	RF
1 Mounting Bracket	BKT075SP		PE
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Threshold	2001 DT x DOW x MS & ES25		PE

1 Sound Seal (Set)	322 DSN x DOW x DOH		PE
1 Astragal	355 DS x DOH		PE

Set: 57 – Orchestra Pit

Doors: 841

4 Concealed Hinge	MK100	Black	MK
1 Classroom Lockset	ML2055 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer/Stop	DC8210 A11	689	RU
1 Mounting Bracket	BKT075SP		PE
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	7770 D x DOW x DOH		ZE
1 Automatic Door Bottom	434 APKL x DOW		PE

Set: 58 – Below Stage Access

Doors: 841.1, 841.2, 841.3

6 Concealed Hinge	MK100	Black	MK
2 Angle Stop	60131	613E	RF
1 Deadlock	DL3013 x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
2 Flush Pull	94C	US10BE	RO
2 Flush Bolt	555 x 12"	US10BE	RO
1 Dust Proof Strike	570	US10BE	RO
2 Overhead Stop	1-X36 x 90 deg	613E	RF

Wood astragal furnished by door manufacturer

Set: 59 – Storage

Doors: 844A

8 Hinge	T4A3786 4-1/2" x 4-1/2"	US10BE	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Automatic Flush Bolt (Top)	2940	US10BE	RO
1 Flush Bolt	557	US10BE	RO
1 Dust Proof Strike	570	US10BE	RO
1 Closer	DC8200	690	RU
<i>(For active leaf of pair only)</i>			
2 Kickplate	K1050 10" x 1" LDW 4BE CSK	US10BE	RO
2 Door Stop	481	US10BE	RO
1 Gasketing (Set)	S88 BL x DOW x DOH		PE

Astragal furnished by door manufacturer

Set: 60 – Lift

Doors: 845.2

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	US10BE	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC5230	690	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Door Stop	481	US10BE	RO
3 Silencer	608		PE

Set: 61 – Lift

Doors: 845.3

4 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	US10BE	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer/Stop	DC8210 A11	690	RU
1 Mounting Bracket	BKT075SP		PE
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	US10BE	RO
1 Threshold	151 B x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 DSN x DOW x DOH		PE
1 Automatic Door Bottom	434 APKL x DOW		PE

Set: 62 – Mechanical Room

Doors: 848

10 Hinge	T4A3786 4-1/2" x 4-1/2" NRP	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Flush Bolt (Top)	555 x 24"	US10BE	RO
1 Flush Bolt	555 x 12"	US10BE	RO
1 Closer/Stop	DC8210 A11	690	RU
<i>(For active leaf of pair only)</i>			
1 Mounting Bracket	BKT075SP		PE
2 Kickplate	K1050 10" x 1" LDW 4BE CSK	US10BE	RO
1 Overhead Stop	9-X36 x 90 deg	613E	RF
<i>(For inactive leaf of pair only)</i>			
1 Mounting Bracket	BKT075SP		PE

STC rated assembly-threshold, sound seal, automatic door bottoms and astragal furnished by door manufacturer

Set: 63 – Loading

Doors: 854F

2 Floor Closer	27SHO x 90 deg	613E	RF
6 Intermediate Pivot	M19	613E	RF
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	613E	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Automatic Flush Bolt (Top)	2840	US10BE	RO
1 Flush Bolt	555 x 12"	US10BE	RO
1 Dust Proof Strike	570	US10BE	RO
2 Armor Plate	K1050 16" x 1" LDW 4BE CSK	US10BE	RO
2 Overhead Holder	9-X26 x 90 deg	613E	RF
1 Gasketing (Set)	S88 BL x DOW x DOH		PE
2 Astragal	355 CS x DOH		PE

(Install one each leaf)

Set: 64 – Unknown

Doors: 882.1

4 Hinge	T4A3786 4-1/2" x 4-1/2"	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	BSP	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8200	BSP	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO
1 Door Stop	481	BSP	RO

STC rated assembly-threshold, sound seal and automatic door bottom furnished by door manufacturer

Set: 65 – Utility

Doors: 885

4 Hinge	T4A3786 5" x 4-1/2"	USP	MK
1 Storeroom Lockset	ML2057 106X x temporary core x CMK	BSP	RU
1 Permanent Core	To match facility standard x MK	606	OT
1 Closer	DC8200	BSP	RU
1 Kickplate	K1050 10" x 2" LDW 4BE CSK	BSP	RO
1 Wall Stop	406	BSP	RO
1 Threshold	151 BSP x DOW x MS & ES25		PE
1 Sound Seal (Set)	322 BSPSN x DOW x DOH		PE
1 Automatic Door Bottom	420 APKL x DOW		PE

Set: 65 – Existing Door

Doors: EX1, EX2

Existing door and frame to be relocated
All hardware existing to remain

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Glass for exterior windows, doors, and glazed curtain walls.
 - 2. Glazing sealants and accessories.
- B. Related Requirements:
 - 1. Section 084126 "All-Glass Entrances and Partitions" for glass in interior doors and partitions.
 - 2. Section 084213 "Aluminum-Framed Entrances" and Section 084413 "Glazed Aluminum Curtain Walls" for exterior doors and curtainwall systems.
 - 3. Section 088300 "Mirrors" for glass for mirror applications.
 - 4. Section 085673 "Acoustically-Rated Window Assemblies" for glass requirements for control room windows.
 - 5. Section 081113 "Hollow Metal Doors and Frames" for glazing and integral blinds in fire-rated hollow metal doors.

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. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

- C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

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 C1021 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 Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty 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 Manufacturer and Product: Solarban 70 Solar Control Low-E Glass manufactured by Vitro Architectural Glass, 400 Guys Run Road, Cheswick, PA 15024, (855) 887-6457, www.vitroglazings.com.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the International Building Code and ASTM E1300.
 1. Design Wind Pressures: As indicated on Drawings.
 2. Design Snow Loads: As indicated on Drawings.
- B. Windborne-Debris Impact Resistance: Exterior glazing shall pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone for project meeting requirements of Authorities Having Jurisdiction.
- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 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. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- C. 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.
- D. 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 C1036, Type I, Class 1 (clear), Quality-Q3.
- B. Ultraclear Float Glass: ASTM C1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent and solar heat gain coefficient of not less than 0.87.
- C. Fully Tempered Float Glass: ASTM C1048, 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 C1048, 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.

2.5 LAMINATED GLASS

- A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer, ionomeric polymer interlayer, or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written instructions.
 - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.
- B. Windborne-Debris-Impact-Resistant Laminated Glass: Where applicable, comply with requirements specified above for laminated glass except laminate glass with one of the following to comply with interlayer manufacturer's written instructions:
 - 1. Polyvinyl butyral interlayer.
 - 2. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
 - 3. Ionomeric polymer interlayer.
 - 4. Cast-in-place and cured-transparent-resin interlayer.

5. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.

2.6 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190.
 1. Sealing System: Dual seals.
 2. Perimeter Spacer: Where applicable, manufacturer's standard spacer material and construction for application and to meet project requirements. Finish to be selected by Architect from manufacturer's standards.

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. Sealant shall have a VOC content of 250 g/L or less.
 4. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
 6. Select glazing sealant type(s) from options below suitable for application.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - c. Pecora Corporation.
 - d. Sika Corporation.
 - e. The Dow Chemical Company.
 2. Applications: Where required to meet project requirements.
- C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - c. Pecora Corporation.
 - d. Sika Corporation.
 - e. The Dow Chemical Company.
2. Applications: Where required to meet project requirements.
- D. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - c. Pecora Corporation.
 - d. Sika Corporation.
 - e. The Dow Chemical Company.
 2. Applications: Where required to meet project requirements.
- E. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. GE Construction Sealants; Momentive Performance Materials Inc.
 - b. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - c. Pecora Corporation.
 - d. Sika Corporation.
 - e. The Dow Chemical Company.
 2. Applications: Where required to meet project requirements.

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 C1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks:
 - 1. Type and material recommended by sealant or glass manufacturer for application to meet project requirements.
- C. Spacers:
 - 1. Type and material recommended by sealant or glass manufacturer for application to meet project requirements.
- D. Edge Blocks:
 - 1. Type and material recommended by sealant or glass manufacturer.
- E. Cylindrical Glazing Sealant Backing: Where applicable, ASTM C1330, 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.
- 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. Subject to project requirements, apply heel bead of elastomeric sealant.
- F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

- A. 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.

3.6 INSULATING GLASS SCHEDULE

- A. Glass Type GL-#1: Low-E-coated, clear insulating glass.
 - 1. Basis-of-Design Product: Solarban 70 Solar Control Low-E Glass manufactured by Vitro Architectural Glass.
 - 2. Overall Unit Thickness: 1 inch.
 - 3. Outdoor Lite: Ultraclear fully tempered float glass.
 - 4. Interspace Content: Air.
 - 5. Indoor Lite: Ultraclear fully tempered float glass.
 - 6. Low-E Coating: Sputtered on second surface.
 - 7. Winter Nighttime U-Factor: 0.28 maximum.
 - 8. Visible Light Transmittance: 64 percent minimum.
 - 9. Solar Heat Gain Coefficient: 0.27 maximum.
 - 10. Light to Solar Gain (LSG): 2.37.

END OF SECTION 088000

SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes the following types of silvered flat glass mirrors:
 - 1. Annealed monolithic glass mirrors.
 - 2. Backlit mirrors.
- B. Related Requirements:
 - 1. Section 088000 "Glazing" for glass with reflective coatings used for vision and spandrel lites.
 - 2. Section 102800 "Toilet, Bath, and Custodial Accessories" for metal-framed mirrors.
 - 3. Section 265119 "LED Interior Lighting" for wall mounted Light Fixture Installation

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.
- C. Samples: For each type of the following:
 - 1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
 - 2. Mirror Clips: Full size.
 - 3. Mirror Trim: 12 inches long.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of mirror **and mirror mastic**.

- C. Preconstruction Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing and substrates on which mirrors are installed.
- D. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For mirrors to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing.
 - 1. Testing is not required if data are submitted based on previous testing of mirror mastic products and mirror backing matching those submitted.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: **Five** years from date of **Substantial Completion**.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Avalon Glass and Mirror Company.
 2. Binswanger Mirror; a division of Vitro America, Inc.
 3. D & W Incorporated.
 4. Donisi Mirror Company.
 5. Gardner Glass, Inc.
 6. Gilded Mirrors, Inc.
 7. Glasswerks LA, Inc.
 8. Guardian Glass; SunGuard.
 9. Head West.
 10. Independent Mirror Industries, Inc.
 11. Lenoir Mirror Company.
 12. National Glass Industries.
 13. Stroupe Mirror Co., Inc.
 14. Sunshine Mirror.
 15. Trulite Glass & Aluminum Solutions, LLC.
 16. Virginia Mirror Company, Inc.
 17. Walker Glass Co., Ltd.
 18. TechLighting – Backlit Mirror
- B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.
- C. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.

2.2 SILVERED FLAT GLASS MIRRORS

- A. Mirrors, General: ASTM C1503; **manufactured using copper-free, low-lead mirror coating process.**
- B. Annealed Monolithic Glass Mirrors: Mirror **Glazing** Quality, **clear**.
 1. Nominal Thickness: **6.0 mm**.
- C. Backlit Mirror: Reflection Mirror MR-2.
 1. Manufacturers
 - a. Techlighting: 700VNRFL-LED830
 2. Standard Mirror Glass
 3. Mounting Hardware: Metal.
 4. ETL Listed

5. LED Lamp source
6. Lumens: 1100.
7. Watts: 18 Watts
8. Max Wattage per Bulb: 20 Watts
9. Voltage: 120 Volts
10. Color Temperature: 3000 Kelvin
11. Color Rendering Index: 80 CRI
12. Lamps Included

2.3 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.
- C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. C.R. Laurence Co., Inc.
 - b. Franklin International.
 - c. Liquid Nails Adhesive.
 - d. Macco Adhesives.
 - e. OSI Sealants; Henkel Corporation.
 - f. Palmer Products Corporation.
 - g. Pecora Corporation.
 - h. Royal Adhesives & Sealants.
 - i. Sommer & Maca Industries, Inc.

2.4 MIRROR HARDWARE

- A. Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover edges of mirrors in a single piece.
 1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.04 inch.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Andscot Company, Inc.
 - 2) C.R. Laurence Co., Inc.
 - 3) Stylmark, Inc.

2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively, and a thickness of not less than 0.04 inch.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Andscot Company, Inc.
 - 2) C.R. Laurence Co., Inc.
 - 3) Stylmark, Inc.
3. Finish: **Clear** bright anodized.

- B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield, expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.5 FABRICATION

- A. Fabricate mirrors in the shop to greatest extent possible.
- B. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- C. Mirror Edge Treatment: **Rounded polished**.
 1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
 2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
- B. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers with mirror mastic.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

- A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
 - 1. GANA Publications: "Glazing Manual" and "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- B. Provide a minimum airspace of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. Install mirrors with **mastic and** mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
 - 1. Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.
 - 2. Install mastic as follows:
 - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
 - b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
 - c. After mastic is applied, align mirrors and press into place while maintaining a minimum airspace of 1/8 inch between back of mirrors and mounting surface.

3.4 CLEANING AND PROTECTION

- A. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirrors to be exposed to standing water.
- C. Maintain environmental conditions that prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
- D. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 088300

SECTION 089119 - FIXED LOUVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes fixed formed-metal louvers.
- B. Related Requirements:
 - 1. Refer to Drawings for louver sizes and locations.

1.3 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. Sustainable Design Submittals:
 - 1. Environmental Product Declaration (EPD): For each product.
 - 2. Environmental Product Declaration: For each product.
 - 3. Health Product Declaration: For each product.
 - 4. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
- C. 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.
- D. Samples: For each type of metal finish required.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on tests performed according to AMCA 500-L.
- B. Sample warranties.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:

FIXED LOUVERS

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1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

B. Source Limitations: Obtain all louvers and accessories from a single manufacturer.

1.6 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. 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.
- B. Seismic Performance: 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 Nondrainable-Blade Louver:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Greenheck Fan Corporation.
 - b. Pottorff.
 - c. Ruskin Company.
 2. Louver Depth: See mechanical schedule.
 3. Blade Profile: Plain blade without center baffle.
 4. Frame and Blade Material and Nominal Thickness: 6063-T5 aluminum, .081" nominal wall thickness.
 5. Mullion Type: Semirecessed.
 6. Louver Performance Ratings:
 - a. Free Area: See mechanical schedule in Drawings.

- b. Point of Beginning Water Penetration: Not less than 700 fpm (3.6 m/s).
- c. Air Performance: Not more than 0.10-inch wg (25-Pa) static pressure drop at 700-fpm (3.6-m/s) free-area intake velocity.
7. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

B. Horizontal Drainable-Blade Louver:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Greenheck Fan Corporation.
 - b. Pottorff.
 - c. Ruskin Company.
2. Louver Depth: 6 inches (150 mm).
3. Frame and Blade Material and Nominal Thickness: 6063-T5 aluminum, .081" nominal wall thickness. Mullion Type: Exposed.
4. Louver Performance Ratings:
 - a. Free Area: See mechanical schedule.
 - b. Point of Beginning Water Penetration: Not less than 1000 fpm (5.1 m/s).
 - c. Air Performance: Not more than 0.10-inch wg (25-Pa) static pressure drop at 850-fpm (4.3-m/s) free-area intake velocity.
5. 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 Bird screening, except where insect screening is indicated.

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: Galvanized steel, 1/2-inch- (13-mm-) square mesh, 0.041-inch (1.04-mm) wire.
2. Insect Screening: Galvanized steel, 18-by-14 (1.4-by-1.8-mm) mesh, 0.011-inch (0.28-mm) wire.

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. Galvanized-Steel Sheet: ASTM A653/A653M, [G60 (Z180)] [G90 (Z275)] zinc coating, mill phosphatized.

FIXED LOUVERS

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- D. 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 fastening galvanized steel, use hot-dip-galvanized-steel or 300 series stainless-steel fasteners.
 - 4. For fastening stainless steel, use 300 series stainless-steel fasteners.
 - 5. For color-finished louvers, use fasteners with heads that match color of louvers.
- E. Postinstalled 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 E488/E488M conducted by a qualified testing agency.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- G. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- H. Regional Materials: Products shall be manufactured within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.

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 unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.6 GALVANIZED-STEEL SHEET FINISHES

- A. Finish louvers after assembly.
- B. Surface Preparation: Clean surfaces with nonpetroleum solvent, so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair according to ASTM A780/A780M.
- C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 2 mils (0.05 mm).
 - 1. 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 092116.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes gypsum board shaft-wall assemblies for the following:
 1. Shaft-wall enclosures.
 2. Chase enclosures.
 3. Horizontal enclosures.

1.3 SUBMITTALS

- A. Product Data: For each gypsum board shaft-wall assembly indicated.

1.4 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Provide materials and construction identical to those of assemblies with fire-resistance ratings determined according to ASTM E 119 by a testing and inspecting agency.
- B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01. Review methods and procedures for installing gypsum board shaft-wall assemblies including, but not limited to, the following:
 1. Fasteners proposed for anchoring nonstructural steel framing to building structure.
 2. Wiring devices in shaft-wall assemblies.
 3. Items supported by shaft-wall-assembly framing.
 4. Mechanical work enclosed within shaft-wall assemblies.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.

- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.
- C. Stack panels flat on leveled supports off floor or slab to prevent sagging.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or blotchy surface contamination and discoloration.

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. G-P Gypsum.
 - 2. Lafarge North America Inc.
 - 3. National Gypsum Company.
 - 4. USG Corporation.

2.2 GYPSUM BOARD SHAFT-WALL ASSEMBLIES, GENERAL

- A. Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
 - 1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
 - 2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.

2.3 PANEL PRODUCTS

- A. Recycled Content: Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 20 percent by weight.

- B. Gypsum Liner Panels: Comply with ASTM C 442/C 442M.
 - 1. Type X: Manufacturer's proprietary liner panels with moisture-resistant paper faces.
 - a. Core: 1 inch thick unless noted otherwise.
 - b. Long Edges: Double bevel.
 - 2. Moisture- and Mold-Resistant Type X: Manufacturer's proprietary liner panels with moisture- and mold-resistant core and surfaces; comply with ASTM D 3273.
 - a. Core: 1 inch thick unless noted otherwise.
 - b. Long Edges: Double bevel.
- C. Gypsum Board: As specified in Section 092910 "Gypsum Board Assemblies." Consider using water-resistant backing board if application warrants.
- D. Water-Resistant Gypsum Backing Board: As specified in Section 092910 "Gypsum Board Assemblies."
- E. Cementitious Backer Units: As specified in Section 092910 "Gypsum Board Assemblies."

2.4 NON-LOAD-BEARING STEEL FRAMING

- A. Framing Members: Comply with ASTM C 754 for conditions indicated.
- B. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 - 1. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653, G40 (Z120), hot-dip galvanized, unless otherwise indicated.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.
- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Section 092910 - Gypsum Board Assemblies that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- C. Gypsum Board Joint-Treatment Materials: As specified in Section 092910 "Gypsum Board Assemblies."
- D. Laminating Adhesive: Adhesive or joint compound recommended by manufacturer for directly adhering gypsum face-layer panels and gypsum-base face-layer panels to backing-layer panels in multilayer construction.
 - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- F. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- G. Sound Attenuation Blankets: As specified in Section 092910 "Gypsum Board Assemblies."
- H. Acoustical Sealant: As specified in Section 079200 "Joint Sealants."

2.6 GYPSUM BOARD SHAFT-WALL ASSEMBLIES

- A. Basis-of-Design Product: As indicated on Drawings by design designation of a qualified testing agency.
- B. Fire-Resistance Rating: As indicated.
- C. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
 1. Depth: As indicated.
 2. Minimum Base-Metal Thickness: As indicated.
- D. Runner Tracks: Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches long and in depth matching studs.
 1. Minimum Base-Metal Thickness: As indicated.
- E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dietrich Metal Framing; The System by Metal-Lite, Inc.
 - b. Fire Trak Corp.; Fire Trak.
- F. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches, in depth matching studs, and not less than 0.0329 inch thick.
- G. Room-Side Finish: As indicated on Drawings and in Section 099900 "Finish/Color Schedule."
- H. Shaft-Side Finish: As indicated by fire-resistance-rated assembly design designation.

- I. Insulation: Sound attenuation blankets.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft-wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft-wall assemblies to maintain fire-rating requirements.
 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runner tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
- B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft-wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

- A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
 1. ASTM C 754 for installing steel framing except comply with framing spacing indicated.
 2. Section 092910 - Gypsum Board Assemblies for applying and finishing panels.
- B. Do not bridge architectural or building expansion joints with shaft-wall assemblies; frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment,

services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.

- D. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- G. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect, while maintaining fire-resistance rating of gypsum board shaft-wall assemblies.
- H. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with ASTM C 919 requirements or with manufacturer's written instructions, whichever are more stringent.
- I. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 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, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092116.23

SECTION 092310 –ACOUSTICAL PLASTER SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Seamless acoustical plaster panel system, applied to areas indicated on Drawings.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
- B. Manufacturer's installation instructions and test data substantiating compliance with quality assurance.
- C. Submit manufacturer's written certification that product is 100% free of asbestos, polystyrene, and cellulose.
- D. Submit certification of applicator licensing.
- E. Samples: 12 inch square sample of sprayed on insulation showing texture variations and color for approval. Resubmit as required until approved. All samples must be certified by manufacturer that they are representative of the texture which was acoustically tested in supporting acoustical test reports.
- F. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

1.4 QUALITY ASSURANCE

- A. Applicator: Use only licensed applicator approved by manufacturer for installation of specified product.
- B. Seamless Acoustical Plaster System: Provide materials and system which have been tested to and achieved the following values:

<u>AUTHORITY</u>	<u>PROPERTY</u>	<u>VALUE</u>
ASTM E605	Density	1.8 Lbs./Sq.Ft.
ASTM E84	Surface Burning Characteristics	15, 15
ASTM C423-84	Sound Absorption	NRC = 0.80, minimum

ASTM E761

Compression Strength

125 PSI

- C. Provide test results and procedures from an independent and accredited acoustical testing laboratory. Edges of test samples must be sealed with wooden or metal frames.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store material in accordance with manufacturer's recommendation.
- B. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, contamination, corrosion, construction traffic, and other causes.

1.6 FIELD CONDITIONS

- A. Field Verification: Confirm project conditions prior to installation.

PART 2 - PRODUCTS

2.1 SEAMLESS ACOUSTICAL PLASTER SYSTEM

- A. System Description:
1. Recycled crushed glass board fastened to rigid ceiling framing.
 2. Base coat plaster.
 3. Top coat plaster with smooth finish to match approved sample.
- B. Basis of Design Product: Subject to compliance with requirements, provide StarSilent Acoustic System by Pyrok, inc, or comparable manufacturers meeting basis of design product's acoustical and physical properties, including but not limited to:
1. Pyrok, Starsilent.
 2. Fellert Acoustical Ceilings, Even Better Silk System.
 3. BASWAphon Classic Fine Finish
- C. Finish: Smooth top finish.
- D. Color: White or as indicated in the Color/Finish Schedule.
- E. Thickness: As required for acoustical performance, NRC 0.80 minimum.

2.2 MISCELLANEOUS MATERIALS

- A. As required by manufacturer for a complete application to provide acoustical performance.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by installation.
- D. Perform all patching and repair of insulation required to be done due to cutting, etc. by other trades.
- E. Do not apply finish coats when temperatures are below 55 degrees.

3.2 APPLICATION

- A. Seamless Acoustical Plaster System Application:
 - 1. Apply in accordance with manufacturer's printed instructions.
 - 2. Install 1 ½" cold rolled channel on 4 foot centers and 20 gauge 7/8 inch hot channel on 16 inch centers.
 - 3. Fasten panels to ceiling framing.
 - 4. Apply fix to panel edges and over fasteners.
 - 5. Sand over fasteners and panel seams.
 - 6. Apply additional system coats over entire surface.
 - 7. Trowel finish coat to smooth plaster finish.

3.3 CLEANING AND PATCHING

- A. Remove fall out material immediately upon completion of the work in each area. Clean surfaces to remove evidence of soiling. Repair or replace damaged work surfaces to acceptable conditions.
- B. Coordinate work with other work, to minimize possibility of damage to system resulting from performance of subsequent work. As other units of work are completed in each area, patch damaged areas or surfaces of insulation by patching procedures as required to provide acceptable results.
- C. Provide ventilation as required to properly cure the acoustical finish installation.
- D. Dispose of all waste materials in a proper and legal manner.

END OF SECTION 092310

SECTION 092910 - GYPSUM BOARD ASSEMBLIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 WORK OF THIS SECTION

- A. This Section includes the following:
 1. Non-load-bearing steel framing members for gypsum board assemblies.
 2. Gypsum board assemblies at walls.
 3. Sound attenuation insulation at interior partitions.
 4. Acoustical isolation materials.
 5. Acoustical sealants.

1.3 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA-505 for definitions of terms related to gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 SUBMITTALS

- A. Product Data: Submit product data for each type of product specified including manufacturer's specifications and recommendations for installation.
- B. Sustainable Design Submittals:
 1. Environmental Product Declaration (EPD): For each product.
 2. Product Data: For adhesives and sealants, indicating VOC content.
 3. Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-emitting materials.
 4. Laboratory Test Reports: For ceiling and wall materials, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: Submit shop drawing showing locations, fabrication, and installation of gypsum wallboard assemblies-and details of components, and attachments to other units of work. Details shall include, but not be limited to, the following:
 1. Wall assemblies including framing, wallboard, insulation, joint treatment details.

2. Reinforcement of framing and reinforcement plates for attachment of other work.
3. Expansion joints.
4. Details of trim and accessories.

- D. Product Certificates: Submit product certificates signed by manufacturers of gypsum board assembly components certifying that their products comply with specified requirements.

1.5 QUALITY ASSURANCE

- A. Performance: Fire, structural, and seismic performance meeting requirements of building code and local authorities.
- C. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer.
- D. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.
- E. Single Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board or from a manufacturer acceptable to gypsum board manufacturer.
- F. No gypsum board product is to be used as blocking to support casework, door frames, or other finished or unfinished architectural woodwork.
- G. Field-Constructed Mockup: Typical area.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Storage: Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.
- C. Handling: Handle gypsum board to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.

- B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F (4 deg C). For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F (10 deg C) for 48 hours prior to application and continuously after until dry. Do not exceed 95 deg F (35 deg C) when using temporary heat sources.
- C. Ventilation: Ventilate building spaces, as required, for drying joint treatment materials. Avoid drafts during hot dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
- C. Ceiling and wall materials shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 MANUFACTURERS, STEEL FRAMING, FURRING, AND GYPSUM BOARD

- A. Manufacturers, Steel Framing, Furring and Gypsum Board: Subject to compliance with requirements, provide products by one of the following:
 - 1. Steel Framing and Furring:
 - a. Dale Industries, Inc.
 - b. Dietrich Industries, Inc.
 - c. National Gypsum Company.
 - d. Unimast, Inc.
 - 2. Gypsum Board and Related Products:
 - a. G-P Gypsum Corp.
 - b. National Gypsum Company.
 - c. United States Gypsum Co.
 - d. CertainTeed Corp.

2.3 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

- A. General: Provide components complying with ASTM C 754 for conditions detailed.

GYPSUM BOARD ASSEMBLIES

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- B. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.
- C. Hanger Rods: Mild steel, zinc-coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc-coated or protected with rust-inhibitive paint.
- E. Channels: Cold-rolled steel, 0.05980-inch-minimum thickness (16 gage) of base (uncoated) metal and 7/16-inch-wide flanges.
 - 1. Carrying Channels: 2 inches deep or 1 1/2 inches deep as required for location.
 - 2. Furring Channels: 3/4 inch deep, unless otherwise indicated.
 - 3. Protective Coating: Galvanized coating per ASTM A 525.
 - 4. Hat Channels: 7/8 inch deep, unless otherwise indicated.
- F. Steel Studs for Furring Channels: ASTM C645, flange edges bent back 90 deg. and doubled over to form 3/16-inch minimum lip, 0.0329 inch (20 gage) minimum thickness base metal, depth as is required for location, hot-dip galvanized coating.
- G. Metal Furring Channels: ASTM C645, hat-shaped, depth 7/8", minimum 0.0329-inch thickness (20 gage), galvanized.

2.4 STEEL FRAMING FOR WALLS AND PARTITIONS

- A. General: Provide steel framing members complying with the following requirements:
 - 1. Component Sizes and Spacings: As indicated but not less than that required to comply with ASTM C 754 under the maximum deflection of L/240.
 - 2. Protective Coating: G60 hot-dip galvanized coating per ASTM A 525.
- B. Steel Studs and Runners: ASTM C 645, flange edges of studs bent back 90 deg and doubled over to form 3/16-inch-wide minimum lip (return) and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:
 - 1. Thickness: Minimum 20 gage, unless otherwise indicated.
 - 2. Depth: 3-5/8 inches, unless otherwise indicated.
- C. Metal Furring Channels: ASTM C 645, hat-shaped, depth and minimum thickness of base (uncoated) metal as follows:
 - 1. Depth: 7/8 inch, unless otherwise indicated or required for wallboard application.
 - 2. Thickness: 20 gage, unless otherwise indicated.
- D. Furring Brackets: Serrated-arm type, adjustable, fabricated from corrosion-resistant steel sheet complying with ASTM C 645, minimum thickness of base (uncoated) metal of 0.0329-inch designed for screw attachment to steel studs and steel rigid furring channels used for furring.
- E. Steel Resilient Furring Channels: Furring channels designed to reduce sound transmission, fabricated from steel sheet complying with ASTM A 525 or ASTM A 568 to form 1/2-inch-deep channel of single leg configuration or double big configuration as required for

location and substrate conditions.

- F. Z-furring Members: Manufacturer's standard Z-shaped furring members with slotted or nonslotted web fabricated from steel sheet complying with ASTM A 525, with a minimum base metal (uncoated) thickness of 0.0179-inch, face flange of 1-1/4 inch, wall-attached flange of 7/8 inch, and depth required to fit insulation thickness indicated.
- G. Fasteners for Metal Framing: Provide non-corrosive fasteners of type, material, size, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.
- H. Metal Smoke Barriers: Galvanized steel channel or angle members, minimum 0.0179-inch, size as applicable to fill stud space.

2.5 GYPSUM BOARD PRODUCTS

- A. General: Provide gypsum board in maximum lengths available to minimize end-to-end butt joints and in thicknesses indicated or, if not otherwise indicated, in 5/8-inch thickness unless noted otherwise to comply with ASTM C 840 for application system and support spacing detailed.
 - 1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
 - 2. Regional Materials: Products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- B. Gypsum Wallboard: ASTM C 36.
 - 1. Type: Type X where required for fire-resistive-rated assemblies: sag-resistant type for ceiling surfaces; regular elsewhere, 5/8-inch thickness, typical, unless noted otherwise.
 - 2. Edges: Tapered and featured (rounded or beveled) for prefilling.
- C. Gypsum Backing Board for Multilayer Applications: ASTM C 442 or, where backing board is not available from manufacturer, gypsum wallboard, complying with ASTM C 36.
 - 1. Type: Type X where required for fire-resistive-rated assemblies; sag-resistant type for ceiling surfaces; regular elsewhere.
 - 2. Edges: Manufacturer's standard.
- D. Moisture and Mold-Resistant Gypsum Backing Board: ASTM C 630.
 - 1. Type: Type X where required for fire-resistive-rated assemblies; regular elsewhere.
 - 2. Edges: Tapered and featured (rounded or beveled) for prefilling.
 - 3. Casing: Moisture and mold resistant gypsum board to be encased in a moisture resistant face and back paper.
 - 4. Use: Include for areas around counters with sinks, around sinks mounted to walls, or floors. Do not use in area subject to direct water exposure.
 - 5. Product: Subject to compliance with requirements, products that may be incorporated into

the Work include, but are not limited to “Humitek Gypsum Panels” manufactured by United States Gypsum Co.

- E. Impact-Resistant Gypsum Board: For use in corridors and receiving areas. Meet or exceed ASTM C 1629, Level 3 for surface abrasion and Level 1 for impact resistance.
 - 1. Core: Manufacturer’s standard or as indicated on Drawings.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

- A. Accessories for Interior Installation: Corner beads, edge trim, and control joints complying with ASTM C 1047. Trim is to provide recessed joints in gypsum board systems, limited to vertical applications wherever possible.
- C. Material: Non-corrosive formed metal of sheet steel coated with zinc by hot-dip or electrolytic processes or rolled zinc.
- D. Shapes as required for location and by reference to Fig. 1 designations in ASTM C 1047.
 - 1. Cornerbead on outside corners, unless otherwise indicated.
 - 2. LC-bead with face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.
 - 3. L-bead with face flange only; face flange formed to receive joint compound.
 - 4. U-bead with face and back flanges; face flange formed to be left without application of joint compound.
 - 5. One-piece control joint formed with V-shaped slot, with removable strip covering slot opening.
- E. Aluminum Reveals: Extruded aluminum sections of profiles, types, and dimensions as indicated on Drawings.
 - 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. Fry Reglet Corp.
 - b. Gordon Inc.
 - c. Pittcon Industries.
 - d. Schluter Systems.
 - 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, alloy 6063-T5.
 - 3. Finish: Pre-finished clear anodized.

2.7 JOINT TREATMENT MATERIALS

- A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials

for each application indicated. Joint compound shall be of type which will provide a Level 5 finish over gypsum board surfaces in accordance with GA-214 Standards.

- B. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.
- C. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses required.
 - 1. Where setting-type joint compounds are used as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
 - 2. For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer.
 - 3. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer.
 - 4. For topping compound, use sandable formulation.
 - 5. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
- D. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.
 - 1. Ready-Mixed Formulation: Factory-mixed product.
 - 2. Job-Mixed Formulation: Powder product for mixing with water at Project site.
 - 3. Taping Compound: Formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
 - 4. Topping Compound: Formulated for fill (second) and finish (third) coats.

2.8 ACOUSTICAL ISOLATION MATERIALS

- A. Resilient Low-Profile Sway Brace: Galvanized steel brackets interlocked with a neoprene noise and vibration insert. Shall contain two 1/4" diameter thru-holes to permit use of fasteners to attach braces to studs.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Mason Industries, Inc., Type WIC; www.mason-industries.com
 - b. Kinetics Noise Control, Inc., Type KWSB; www.kineticsnoise.com
 - c. Equal as approved by Architect.
 - 2. Isolator shall be selected upon ability to satisfy a maximum response frequency of 10 Hz for the composite wall/isolator construction. Manufacturer shall submit calculations of loads, isolator spacing, and connection details for approval.
- B. Top Track Isolators: Resilient partition isolation pad used along entire length of track or at connection locations. Shall resiliently decouple sound-rated partition from non-isolated structure.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Mason Industries, Inc., Type NPS; www.mason-industries.com
 - b. Kinetics Noise Control, Inc., Wallmat and KAI; www.kineticsnoise.com
 - c. Equal as approved by Architect.

2.9 ACOUSTICAL SEALANT

- A. Acoustical Sealant: Non drying, nonhardening, non skinning, nonstaining, non-acid-curing, gunnable, synthetic rubber sealant.
 - 1. Sealant shall have a VOC content of 250 g/L or less.
 - 2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Products: Refer to Section 079200 Joint Sealants for products acceptable for non fire-rated partitions and fire-rated partitions.

2.10 MISCELLANEOUS MATERIALS

- A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.
- B. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum panels.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot grouting hollow metal door frames.
- D. Fasteners: Type, material, size, corrosion resistance, holding power and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum drywall manufacturers for applications indicated.
- E. Steel Backing Plate: 6 inch continuous steel galvanized reinforcement strip fastened to wall framing for attachment of wall mounted items; 20 gage for wall supported equipment, fixtures, and trim; 16 gage for wall supported countertops, handrails, etc. Include toggle bolts for mounting to stud framing. Refer to Drawings for locations and height of wall mounted items.
- F. Air Infiltration Barrier: Nonwoven polymeric sheet air infiltration barrier.
- G. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
- H. Sound Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining glass fibers with thermosetting resins to comply with ASTM C 665, Type I blankets without membrane. Basis of Design: Thermafiber; USG Interiors, Inc.

- I. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLING STEEL FRAMING, GENERAL

- A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.
- B. Supplementary Framing: Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with "Gypsum Construction Handbook" published by United States Gypsum Co.
- C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.
 1. Where building structure abuts ceiling perimeter or penetrates ceiling.
 2. Where partition framing and wall furring abut structure except at floor.
- D. Do not bridge building expansion and control joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members.

3.3 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

- A. General: Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction. Where studs are installed directly against exterior walls, install asphalt felt strips between studs and wall.
- B. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.
- C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Cut studs 1/2

inch short of full height. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

- D. For fire-resistive-rated partitions requiring partitions to extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.
- E. Terminate partition framing at suspended ceilings where indicated.
- F. Install steel studs and furring in sizes and at spacings indicated but not less than that required by the referenced steel framing installation standard to comply with maximum deflection and minimum loading requirements specified.
 - 1. Space studs at 16 inches o.c., under otherwise indicated.
 - 2. Space wall furring members 16 inches o.c., unless otherwise indicated.
- G. Install steel studs so that flanges point in the same direction and leading edges or ends of each gypsum board can be attached to open (unsupported) edges of stud flanges first.
- H. Frame door openings to comply with GA-600, and with applicable published recommendations of gypsum board manufacturer.
 - 1. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames.
 - 2. Install runner track section (for cripple studs) at head and secure to jamb studs.
 - 3. Install two studs at each jamb, unless otherwise indicated.
- I. Frame openings other than door openings to comply with details as required for door openings. Install framing below sills of openings to match framing required above door heads.
- J. Grouting Frames:
 - 1. Solid Grouting: Hollow metal frames shall be grouted solid with grout before installation of wallboard. Assure grout is solid at all jamb anchor clips.
 - 2. Spot Grouting: Where solid grouting is not indicated, spot grout hollow metal door frames for solid core wood doors, hollow metal doors, and doors over 32" wide. Apply spot grout at each jamb anchor clip just before inserting board into frame.
 - 3. Coordination: Coordinate grouting of frames with Section 081113 - Hollow Metal Doors and Frames.

3.4 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

- A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.
- B. Install sound attenuation blankets and mineral wool batts required for fire resistive rated assemblies where indicated prior to installing gypsum panels unless blankets are readily

installed after panels have been installed on one side.

- C. Install wall/partition board panels to minimize the number of abutting end joints or avoid entirely. Stagger abutting end joints not less than one framing member in alternate courses of board. At stairwells and other high walls, install panels horizontally with end abutting joints over studs and staggered.
- D. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- E. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position adjoining panels so that tapered edges abut tapered edges, and field-cut edges abut field-cut edges and ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions. Avoid joints at corners of framed openings where possible.
- F. Attach gypsum panels to steel studs so that the leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- G. Attach gypsum panels to framing provided at openings and cutouts.
- H. Form control joints and expansion joints with space between edges of adjoining gypsum panels as well as supporting framing behind gypsum panels.
- I. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.) except in chase walls that are braced internally.
 - 1. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of roof decks, cut gypsum panels to fit profile formed by joists and other structural members; allow 1/4-to-1/2-inch-wide joints to install sealant.
- J. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4-inch-to-1/2-inch-wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- K. Acoustical Sealant: Seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C 919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

- L. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.

3.5 GYPSUM BOARD APPLICATION METHODS

- A. Single-Layer Application: Install gypsum wallboard panels as follows:
 - 1. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
 - 2. On fire rated partitions/walls, apply gypsum panels vertically (parallel to framing), and provide panel lengths that will minimize end joints.
 - 3. On non-rated partitions/walls, apply gypsum panels horizontally (perpendicular to framing). Use maximum-length panels to minimize end joints.
 - 4. On Z furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- B. Moisture and Mold-Resistant Board:
 - 1. Install moisture and mold-resistant gypsum backing board panels where countertops with sinks occur, where sinks are mounted to walls, and other locations where indicated.
 - 2. Where tile backing panels abut other types of panels in the same plane, shim surfaces to produce a uniform plane across panel surfaces.
- C. Double-Layer Application: Install gypsum backing board for base layers and gypsum wallboard for face layers.
 - 1. On ceilings, apply base layer prior to applying base layer on walls/partitions; apply face layers in same sequence. Offset face-layer joints at least 10 inches from parallel base-layer joints. Apply base layers at right angles to framing members unless otherwise indicated.
 - 2. On partitions/walls, apply base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face layer joints offset at least one stud or furring member with base layer joints. Stagger joints on opposite sides of partitions.
- D. Single-Layer Fastening Methods: Apply gypsum panels to metal framing by fastening with screws.
- E. Double-Layer Fastening Methods: Apply base layer of gypsum panels and face layer to base layer by fastening base layers with screws and face layer with adhesive and supplementary fasteners.
- F. Direct-Bonding to Substrate: Where gypsum panels are indicated as directly adhered to a solid substrate (other than studs, furring members or base layer of gypsum board), comply with gypsum board manufacturer's recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.6 INSTALLING TRIM ACCESSORIES

- A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.
- B. Install corner beads at external corners.
- C. Install metal edge trim where edge of gypsum panels would otherwise be exposed or semiexposed. Provide edge trim type with face flange formed to receive joint compound except where other types are indicated.
 - 1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
 - 2. Install L-bead where edge trims can only be installed after gypsum panels are installed.
 - 3. Install U-bead where edge is to be exposed, revealed, or sealant filled.
- D. Install control joints at locations where indicated or, if not indicated, according to ASTM C 840 and in locations approved by Architect for visual effect.

3.7 INSTALLATION OF ACOUSTIC ISOLATION PRODUCTS

- A. General:
 - 1. Acoustic isolation products shall be installed following the manufacturer's recommended procedures in areas indicated on the contract drawings.
 - 2. 3. The Contractor shall be responsible for notifying the Architect at a time which allows for inspections of the products identified in this section prior to the construction of other millwork, walls, ceilings, or other requirements which would obscure visual inspection of these acoustical products.
- B. Coordinate with installation of other gypsum board assemblies.

3.8 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration and levels of gypsum board finish indicated.
- B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound recommended by manufacturer.
- C. Apply joint tape over gypsum board joints except those with trim accessories having concealed face flanges not requiring taping to prevent cracks from developing in joint treatment at flange edges.

- D. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.
1. Level 1 for ceiling plenum areas and concealed areas unless a higher level of finish is required for fire-resistive-rated assemblies.
 2. Level 2 where water-resistant gypsum backing board panels form substrates for tile.
 3. Level 3 for surfaces to receive heavy duty wallcoverings
 4. Level 4 for general finishing of joints in gypsum board surfaces to receive flat paints or wallcovering.
 5. Level 5 for finishing of gypsum board where a high level of finish is required.
- E. General Gypsum Board Joint Finish: Embed tape in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration. Install embedding and first coat, fill coat, and finish coat in accordance with joint compound manufacturer recommendations to achieve Finish Level as applicable to each installation.
- F. Joints in Water-Resistant Gypsum Board: Finish joints in water-resistant gypsum backing board to comply with ASTM C 840 and board manufacturer's directions for treatment of joints behind tile.

3.9 CLEANING AND PROTECTION

- A. Promptly remove any residual joint compound from adjacent surfaces.
- B. Provide final protection and maintain conditions, in a manner suitable to Installer, that ensures gypsum board assemblies remain without damage or deterioration at time of Substantial Completion.

END OF SECTION 092910

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Pressed floor tile.
2. Porcelain tile.
3. Glazed wall tile.
4. Tile backing panels.
5. Waterproof membrane for thinset applications.
6. Crack isolation membrane.
7. Metal edge strips.

- B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Section 092613 "Gypsum Veneer Plastering" for cementitious backer units.
3. Section 092900 "Gypsum Board" for cementitious backer units.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Face Size: Actual tile size, excluding spacer lugs.
- D. Module Size: Actual tile size plus joint width indicated.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- D. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required
 - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 36 inches, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
 - 3. Full-size units of each type of trim and accessory.
 - 4. Metal edge strips in 6-inch lengths.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product.
- D. Product Test Reports: For tile-setting and -grouting products.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer is a Five-Star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
 - 2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 - 1. Stone thresholds.
 - 2. Waterproof membrane.
 - 3. Crack isolation membrane.
 - 4. Cementitious backer units.
 - 5. Metal edge strips.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise 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.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.3 TILE PRODUCTS

A. Ceramic Tile Types TB-1 & TL-1: Porcelain tile.

1. Certification: Tile certified by the Porcelain Tile Certification Agency.
2. Face Size: 11-13/16 by 11-13/16 inches.
3. Face Size Variation: Rectified.
4. Thickness: 3/8 inch.
5. Face: Plain with square edges.
6. Dynamic Coefficient of Friction: Not less than 0.42.
7. Tile Color, Glaze, and Pattern: Match Architect's sample.
8. Grout Color: As selected by Architect from manufacturer's full range.
9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Cap: Surface bullnose, module size same as adjoining flat tile short end.

B. Ceramic Tile Type TL-2: Cement tile.

1. Composition: Concrete Cement.
2. Face Size: 8 by 8 inches.
3. Face Size Variation: Calibrated or rectified
4. Thickness: 5/8inch.
5. Face: Plain with square edges.
6. Dynamic Coefficient of Friction: Not less than 0.42.
7. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
8. Grout Color As selected by Architect from manufacturer's full range.

C. Ceramic Tile Type TL-3: Glazed wall tile.

1. Module Size: 4 by 16 inches.
2. Thickness: 5/16 inch.
3. Face: Plain with modified square edges or cushion edges.
4. Finish: Bright, opaque glaze.
5. Tile Color and Pattern: Match Architect's sample.
6. Grout Color: As selected by Architect from manufacturer's full range.
7. Mounting: Factory, back mounted.
8. Mounting: PregROUTED sheets of tiles are factory assembled and grouted with manufacturer's standard white silicone rubber.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A, in maximum lengths available to minimize end-to-end butt joints.

1. Thickness: 5/8 inch.

2.5 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
- C. Latex-Portland Cement Waterproof Mortar: Flexible, waterproof mortar consisting of cement-based mix and latex additive.
- D. Waterproofing and Tile-Setting Adhesive: One-part, fluid-applied product intended for use as both waterproofing and tile-setting adhesive in a two-step process.

2.6 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.12 is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch nominal thickness.
- C. Corrugated Polyethylene: Corrugated polyethylene with dovetail-shaped corrugations and with anchoring webbing on the underside; 3/16-inch nominal thickness.
- D. Crack Isolation Membrane and Tile-Setting Adhesive: One-part, fluid-applied product intended for use as both a crack isolation membrane and tile-setting adhesive in a two-step process.

2.7 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
 - 1. Cleavage Membrane: Asphalt felt, ASTM D226/D226M, Type I (No. 15); or polyethylene sheeting, ASTM D4397, 4.0 mils thick.
 - 2. Reinforcing Wire Fabric: Galvanized, welded-wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A185/A185M and ASTM A82/A82M, except for minimum wire size.
 - 3. Expanded Metal Lath: Diamond-mesh lath complying with ASTM C847.
 - a. Base Metal and Finish for Interior Applications: Uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.
 - b. Base Metal and Finish for Exterior Applications: Zinc-coated (galvanized) steel sheet.
 - c. Configuration over Studs and Furring: Flat.
 - d. Configuration over Solid Surfaces: Self-furring.

- e. Weight: [2.5 lb/sq. yd.] [3.4 lb/sq. yd.].
- 4. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.
- B. Modified Dry-Set Mortar (Thinset): ANSI A118.4.
 - 1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 - 2. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
 - 3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.
- C. Medium-Bed, Modified Dry-Set Mortar: Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of [5/8 inch]
 - 1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 - 2. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
- D. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.
 - 1. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 - 2. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
 - 3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.15.
- E. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ARDEX Americas.
 - b. Atlas Minerals & Chemicals, Inc.
 - c. Bonsal American, an Oldcastle company.
 - d. Bostik, Inc.
 - e. C-Cure.
 - f. Custom Building Products.
 - g. H.B. Fuller Construction Products Inc. / TEC.
 - h. Jamo Inc.
 - i. LATICRETE SUPERCAP, LLC.
 - j. MAPEI Corporation.
 - k. Merkrete; a Parex USA, Inc. brand.
 - l. Southern Grouts & Mortars, Inc.

m. Summitville Tiles, Inc.

2. Adhesives shall have a VOC content of 65g/L or less.
3. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F, respectively, and certified by manufacturer for intended use.

2.8 GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.
- B. High-Performance Tile Grout: ANSI A118.7.
 1. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.
 2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
- C. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less.
 1. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F, respectively, and certified by manufacturer for intended use.

2.9 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-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; aluminum exposed-edge material.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.10 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, 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.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF CERAMIC TILE

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors consisting of tiles 8 by 8 inches or larger.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Cement Tile: See TCNA article ANSI A108.02 Section 4.3.8.

2. Glazed Wall Tile: 1/8 inch.
3. Porcelain Tile: 1/8 inch.

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Metal Edge Strips: Install at locations indicated.

3.4 INSTALLATION OF TILE BACKING PANEL

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.5 INSTALLATION OF WATERPROOF MEMBRANE

A. Install waterproof membrane 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 waterproof membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 INSTALLATION OF CRACK ISOLATION MEMBRANE

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.7 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.

2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.8 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.9 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 1. Ceramic Tile Installation: TCNA F122; thinset mortar on waterproof membrane.
 - a. Ceramic Tile Type: TL-2.
 - b. Thinset Mortar: Improved modified dry-set mortar.
 - c. Grout: High-performance sanded grout.
 2. Ceramic Tile Installation: TCNA F125-Full; thinset mortar on crack isolation membrane.
 - a. Ceramic Tile Type: TL-2.
 - b. Thinset Mortar: Improved modified dry-set mortar.
 - c. Grout: High-performance sanded grout.
- B. Interior Wall Installations, Masonry or Concrete:
 1. Ceramic Tile Installation: TCNA W202; thinset mortar.
 - a. Ceramic Tile Type: TB-1, TL-2 & TL-3.
 - b. Thinset Mortar: Improved modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.

- C. Interior Wall Installations, Wood or Metal Studs or Furring:
1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board.
 - a. Ceramic Tile Type: TB-1, TL-2 & TL-3.
 - b. Thinset Mortar: Improved modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.

END OF SECTION 093013

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for interior ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, trim, and other ceiling attachment devices to be cast in concrete.

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. Sustainable Design Submittals:
 - 1. Laboratory Test Reports: For ceiling products, indicating compliance with requirements for low-emitting materials.
- C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
- D. Samples for Initial Selection: For components with factory-applied finishes.
- E. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Acoustical Panels: Set of 6-inch-square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch-long Samples of each type, finish, and color.
- F. Delegated-Design Submittal: For seismic restraints for ceiling systems.
 - 1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Ceiling suspension-system members.
 2. Structural members to which suspension systems will be attached.
 3. Method of attaching hangers to building structure.
 - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
 5. Size and location of initial access modules for acoustical panels.
 6. Items penetrating finished ceiling and ceiling-mounted items including the following:
 - a. Lighting fixtures.
 - b. Diffusers.
 - c. Grilles.
 - d. Speakers.
 - e. Sprinklers.
 - f. Access panels.
 7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
 8. Minimum Drawing Scale: 1/4 inch = 1 foot.
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.
- E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 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. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to 1 percent of quantity installed.

1.8 QUALITY ASSURANCE

- A. 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 mockup of typical ceiling area as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Ceiling products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.
- C. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class **A** according to ASTM E1264.
 - 2. Smoke-Developed Index: **50** or less.
- D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS APC-1

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc
 - 2. Rockfon (Rockwool International)
 - 3. Certainteed Corporation
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 30 percent.

- D. Classification: Provide fire-resistance-rated panels as follows:
 - 1. Type and Form: Type XX, high-density, Stone wool- and/or mineral-base panels, resistant to heat, moisture, and corrosive fumes.
 - 2. Pattern: E (lightly textured).
- E. Color: White.
- F. Light Reflectance (LR): Not less than 0.85.
- G. Noise Reduction Coefficient (NRC): Not less than 0.85.
- H. Articulation Class (AC): Not less than 180.
- I. Edge/Joint Detail: Reveal sized to fit flange of exposed suspension-system members.
- J. Thickness: 5/8 inch.
- K. Modular Size: 24 by 24 inches
- L. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

2.4 ACOUSTICAL PANELS APC-2

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc
 - 2. Rockfon (Rockwool International)
 - 3. Certainteed Corporation
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 70 percent.
- D. Classification: Provide fire-resistance-rated panels as follows:
 - 1. Type and Form: Type III, mineral base with painted finish.
 - 2. Pattern: E (lightly textured).
- E. Color: White.

- F. Light Reflectance (LR): Not less than 0.90.
- G. Noise Reduction Coefficient (NRC): Not less 0.75.
- H. Edge/Joint Detail: Reveal sized to fit flange of exposed suspension-system members.
- I. Thickness: 3/4 inch.
- J. Modular Size: 12 by 48 inches.

2.5 ACOUSTICAL PANELS APC-3

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Gypsum.
 - 2. Armstrong World Industries, Inc.
 - 3. CertainTeed Corporation.
 - 4. Rockfon (Rockwool International).
 - 5. Tectum Inc.
 - 6. USG Corporation.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 30 percent.
- A. Classification: Provide fire-resistance-rated panels as follows:
 - 1. Type and Form: Type XX, high-density, Stone wool- and/or mineral-base panels, resistant to heat, moisture, and corrosive fumes.
 - 2. Pattern: E (lightly textured).
- B. Color: White.
- C. Light Reflectance (LR): Not less than 0.85.
- D. Noise Reduction Coefficient (NRC): Not less than 0.95.
- E. Articulation Class (AC): Not less than 190.
- F. Edge/Joint Detail: Reveal sized to fit flange of exposed suspension-system members.
- G. Thickness: 1 inch.
- H. Modular Size: 24 by 60 inches.

2.6 ACOUSTICAL PANELS APC-4

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Gypsum.
 2. Armstrong World Industries, Inc.
 3. CertainTeed Corporation.
 4. Rockfon (Rockwool International).
 5. Tectum Inc.
 6. USG Corporation.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 30 percent.
- D. Classification: Provide fire-resistance-rated panels as follows:
1. Type and Form: Type XX, high-density, Stone wool- and/or mineral-base panels, resistant to heat, moisture, and corrosive fumes. Vinyl Faced for cleanability.
 2. Pattern: (smooth).
- E. Color: Black.
- F. Light Reflectance (LR): N/A.
- G. Noise Reduction Coefficient (NRC): Not less than 0.90.
- H. Edge/Joint Detail: Square.
- I. Thickness: 1 inch
- J. Modular Size: 24 by 24 inches

2.7 ACOUSTICAL PANELS APC-5

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Armstrong World Industries, Inc
 2. Rockfon (Rockwool International)
 3. Certainteed Corporation

- B. Acoustical Panel Standard: Provide manufacturer's standard water repellent panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 30 percent.
- D. Classification: Provide fire-resistance-rated panels as follows:
 - 1. Type and Form: Type XX, high-density, Stone wool- and/or mineral-base panels, resistant to heat, moisture, and corrosive fumes. Suitable for use in areas subject to high-humidity.
 - 2. Pattern: E (lightly textured).
- E. Color: White.
- F. Light Reflectance (LR): Not less than 0.85.
- G. Noise Reduction Coefficient (NRC): Not less than 0.80.
- H. Articulation Class (AC): Not less than 170.
- I. Edge/Joint Detail: Reveal sized to fit flange of exposed suspension-system members.
- J. Thickness: 5/8 inch.
- K. Modular Size: 24 by 24 inches
- L. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.
- M. Durability: Meet USDA/FSIS guidelines for use in kitchens.

2.8 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. CertainTeed Corporation.
 - 3. Rockfon (Rockwool International).
 - 4. USG Corporation.

- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M and designated by type, structural classification, and finish indicated.
 - 1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635/C635M.
- C. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- D. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 9/16-inch-wide metal caps on flanges.
 - 1. Structural Classification: Intermediate-duty system.
 - 2. End Condition of Cross Runners: Override (stepped) type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Cold-rolled steel or aluminum.
 - 5. Cap Finish: Painted White. Painted Black where Black Ceiling Panels are used.

2.9 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. 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 hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E1190, conducted by a qualified testing and inspecting agency.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
 - 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch-diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.

- F. Variable Placement Hook Clips: Manufacturer's standard variable placement hook clips which attach to T-bar to create special length tees and position anywhere along the main beams, for use with APC-2 12x48 panels for ease of access above ceiling.
- G. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.
- H. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- I. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

2.10 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C636/C636M, seismic design requirements, and manufacturer's written instructions.

1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. 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.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated or as recommended by Manufacturer at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels and penetrations.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.

3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- 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 panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit. Apply trim and acoustical sealant as required at borders and penetrations for a clean appearance and complete installation.
 1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 - b. Install panels with pattern running in one direction parallel to long axis of space.
 - c. Install panels in a basket-weave pattern.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 5. Install clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.
 6. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet non-cumulative.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

- C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
 - 1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
 - 2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.6 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096400 - WOOD FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Factory-finished wood flooring at Multipurpose Room where indicated on Drawings.
 - 2. Sound control underlayment.
- B. Related Requirements:
 - 1. Finish/Color Schedule and Finish Drawings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
 - 2. Chain-of-Custody Qualification Data: For manufacturer and vendor.
 - 3. Product Data: For adhesives, indicating VOC content.
 - 4. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 5. Product Data: For coatings, indicating VOC content.
 - 6. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.
 - 7. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.
 - 8. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For each type of floor assembly and accessory. Include plans, sections, and attachment details. Include expansion provisions and trim details.
- D. Samples: For each exposed product and for each color and texture specified, approximately 12 inches long and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Wood Flooring: Equal to 10 percent of amount installed for each type, color, and finish of wood flooring indicated.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wood flooring materials in unopened cartons or bundles.
- B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet-work is complete and dry.
- C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

1.7 FIELD CONDITIONS

- A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.
 - 1. Environmental Conditioning: Maintain ambient temperature between 65 and 75 deg F and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
 - 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
 - a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
 - b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Flooring products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Certified Wood: Wood products shall be certified as "FSC Pure" according to FSC STD-01-001 and FSC STD-40-004.
- C. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
- D. Hardwood Flooring: Comply with NWFA A500 for species, grade, and cut.
 - 1. Certification: Provide flooring that carries NWFA grade stamp on each bundle or piece.
- E. Floor at Multipurpose Room
 - 1. Location: Where indicated on the Drawings.
 - 2. Wood strip flooring: Pre-finished solid hardwood, non-combustible tongue-in-groove strip flooring, 5" wide.
 - 3. Manufacturer and Product: Junckers or approved equal.
 - 4. Species: Nordic Oak.
 - 5. Grade: Manufacturer's standard for application.
 - 6. Thickness: 5/4" nominal (1-1/8" actual).
 - 7. Finish: Refer to Finish/Color Schedule.
 - 8. Subflooring: 3/4" AC Exterior grade plywood subfloor as indicated in Drawings.
 - 9. Wood Trim: Where indicated, or where required for a complete installation, provide and install wood trim of same species, grade, finish, and cut as adjacent wood flooring.
 - 10. Sleepers: Fire- Retardant Construction Grade Douglas Fir, 2" x 4" pressure treated with water-borne preservatives. Where indicated, in layers and spacing indicated in Drawings to achieve indicated floor finish elevation.

2.2 SOUND CONTROL UNDERLAYMENT

- A. Sound Control Underlayment: Sound reducing underlayment consisting of impact-absorbing materials.
 - 1. Material: Polyfoam.
 - 2. Thickness: 2.2 mm.

2.3 ACCESSORY MATERIALS

- A. Subconstruction System: Manufacturer's standard clip floating floor system for application and project conditions.

- B. Wood Sleepers and Subfloor: As indicated in Drawings or as required by manufacturer and project conditions.
- C. Wood Underlayment: As indicated in Drawings or as required by manufacturer and project conditions.
- D. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than 8.0 mils thick.
- E. Asphalt-Saturated Felt: ASTM D 4869/D 4869M, Type II.
- F. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.
- G. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood flooring manufacturer.
- H. Fasteners: As recommended by manufacturer for application, but not less than that recommended in NWFA's "Installation Guidelines."
- I. Thresholds and Saddles: To match wood flooring. Tapered on each side.
- J. Reducer Strips: To match wood flooring, tapered, and in thickness required to match height of flooring.
- K. Cork Expansion Strip: Composition cork expansion strip.
- L. Slip Membrane: 15# felt paper.
- M. Isolation Pads: 3/8" 45-50 Durometer neoprene pads.
- N. Acoustic Sealant: As recommended by flooring manufacturer.
- O. Perimeter Isolation: 3/8" thick fiberglass board, 6-15 pcf.
- P. Self-Leveling Underlayment: Where needed, DSP-520 by H.B. Fuller or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., 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. 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 by manufacturer. Proceed with installation only after substrates pass testing.

3.2 PREPARATION

- A. Concrete Slabs:
 1. Grind high spots and fill low spots to produce a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge.
 2. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
 3. Remove coatings, including curing compounds, and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- B. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. General: Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines."
- B. Pattern: Comply with pattern or direction of pattern for laying wood flooring, as directed by Architect.
- C. Wood Sleepers, Subfloor, Finish Floor: Musical Theater Stage Floor:
 1. Provide treated-wood fire retardant sleepers, random length 18" to 48", installed in rows with initial row at right angles to the longest dimension of the room or at a ninety (90) degree angle to the direction surface floor is to be laid. Sleepers shall be laid, with end joints staggered, in rows twelve (12) inches o.c. with ends lapped four (4) inches. Second layer of sleepers shall be laid at ninety degrees to and in the same manner as the first layer. Sleepers shall be dry – no excess residue of treatment chemical.
 2. Sleepers shall rest on neoprene isolation pads, minimum 12" o.c.
 3. Fill between each sleeper with mineral wool batts to full height of sleepers.
 4. Install 3/4" AC exterior grade subfloor over sleepers.
 5. Shim beneath subfloor as required so that the surface is level within tolerance of +/- 1/8" over any 10-foot radius.

6. Tolerance of finish floor surface at floor edges shall be within 1/8" of adjacent floors and flush thresholds.
 7. Install pre-finished stage wood strip flooring over 15# felt paper.
 8. Orient stage wood strip flooring running parallel to apron edge/audience seating.
 9. No visible fasteners permitted. Blind nail flooring to each sleeper spacing nails 8" o.c. along length of sleeper in accordance with NWFA recommendations.
- D. Provide expansion space at walls and other obstructions and terminations of flooring of not less than 1/2 inch. Fill expansion space with flush cork expansion strip. Nail shoe molding or other trim, if required, to baseboard rather than to flooring.
- E. Vapor Retarder: Comply with the following for vapor retarder installation:
1. Wood Flooring Nailed to Wood Subfloor: Install flooring over a layer of asphalt-saturated felt.
 2. Wood Flooring Nailed to Sleepers over Concrete: Install flooring over a layer of polyethylene sheet with edges overlapped over sleepers and turned up behind baseboards.
 3. Wood Flooring Installed Directly on Concrete: Install a layer of polyethylene sheet according to flooring manufacturer's written instructions.
- F. Sound Control Underlayment: Install over vapor retarder according to manufacturer's written instructions.

3.4 PROTECTION

- A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.
1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.
- B. Clean floors by vacuuming and dry sweeping. Do not wet or damp mop floors. Examine all floors for damage and make necessary repairs. If damage is irreparable, remove and replace affected strips at no additional cost to the Owner.

END OF SECTION 096400

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient Wall Base
 - 2. Resilient Stair Nosing
 - 3. Resilient Reducer

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.
- E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Coordinate mockups in this Section with mockups specified in other Sections.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL BASE – RB-1

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 - 3. Flexco.
 - 4. Johnsonite; a Tarkett company. (Basis of Design)

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5. Roppe Corporation, USA.
- B. Product Standard: ASTM F1861, Type TV (vinyl, thermoplastic).
 1. Group: I (solid, homogeneous).
 2. Style: Cove.
- C. Minimum Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Colors and Patterns: As indicated on Finish Schedule.

2.2 VINYL STAIR ACCESSORIES RS-1

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Armstrong World Industries, Inc.
 2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 3. Flexco.
 4. Johnsonite; a Tarkett company. (Basis of Design)
 5. Roppe Corporation, USA.
- C. Stair Treads: ASTM F2169, Type TV (vinyl, thermoplastic).
 1. Class: 1 (smooth, flat).
 2. Nosing Style: Round with grooved lines on top surface.
 3. Nosing Height: 13/16 inch.
 4. Thickness: 1/4 inch and tapered to back edge.
 5. Size: Lengths and depths to fit each stair tread in one piece.
- D. Locations: Provide vinyl stair accessories in areas indicated.
- E. Colors and Patterns: 40 - Black.

2.3 VINYL MOLDING ACCESSORY RR-1

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 - 3. Flexco.
 - 4. Johnsonite; a Tarkett company. (Basis of Design)
 - 5. Roppe Corporation, USA.
- B. Description: Vinyl carpet reducer for glue-down applications>.
- C. Profile and Dimensions: As indicated.
- D. Locations: Provide vinyl molding accessories in areas indicated.
- E. Colors and Patterns: 32 - Pebble.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated. Retain "Stair-Tread Nose Filler" Paragraph below if resilient stair treads are specified in this Section.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F710.
 - 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 substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 6 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 6 inches in length.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 1. Remove adhesive and other blemishes from surfaces.
 2. Sweep and vacuum horizontal surfaces thoroughly.
 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519 – RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Resilient Flooring

1.2 SUBMITTALS

- A. Product Data: Manufacturer's published data including maintenance data.
- B. Samples: Manufacturer's color charts consisting of actual tiles or sections of tiles showing full range of colors and patterns available for each type of resilient floor tile and base indicated.
- C. Results from Calcium Chloride Test and Bond and Moisture Test.
- D. Sustainable Design Submittals:
 - 1. Product Data: For adhesives, indicating VOC content.
 - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 3. Product Data: For chemical-bonding compounds, indicating VOC content.
 - 4. Laboratory Test Reports: For chemical-bonding compounds, indicating compliance with requirements for low-emitting materials.
 - 5. Product Data: For sealants, indicating VOC content.
 - 6. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
 - 7. Laboratory Test Reports: For flooring products, indicating compliance with requirements for low-emitting materials.
 - 8. Documents showing compliance with FloorScore
- E. Installer Statement of Compliance: Certify VCT is installed in accordance with manufacturer's installation instructions to validate manufacturer's warranty.
- F. Sample warranty

1.3 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain each type, color, and pattern from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

- B. Contractor Qualifications:
1. Employ contractors skilled in the successful installation of the specified materials and accessories on similar projects for a minimum of five years.
 2. Installing company shall employ a minimum of three qualified installers each with a minimum of two years experience installing VCT flooring.
- C. Fire Performance Characteristics: Determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
1. Critical Radiant Flux: 0.45 watts per sq. cm or more per ASTM E 648.
 2. Smoke Density: Less than 450 per ASTM E 662.
 3. Flame Spread: Less than 75 per ASTM E 84.
- D. Calcium Chloride Test: Measure moisture vapor emissions from the concrete slab on grade, prior to the installation of the resilient flooring. Maximum moisture emissions levels shall be as recommended by the resilient flooring manufacturer.
- E. Bond and Moisture Tests: Conduct bond and moisture tests prior to installation. Bond and moisture tests shall be in accordance with manufacturer's recommendations. Provide frequency of tests as recommended by manufacturer.
1. Test concrete slabs in accordance with ASTM F 1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride to ensure emission of no more than 3 lbs of water/1000 sf of slab in 24-hour period.
 2. When test cannot be conducted under temperature and humidity conditions that will prevail under normal conditions, provide and maintain the 75 Deg F (+/- 5 Deg F) temperature and 50 percent (+/- 10 percent) humidity for 48 hours prior to and during the test.
- F. Flooring products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- G. VCT to be tested for compliance with FloorScore Voluntary Certification Program.
- H. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
1. Adhesives shall have a VOC content of 50 g/L or less.
 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Site in original unopened containers each bearing names of product and manufacturer, project identification, and shipping and handling instructions.
- B. Store materials in dry spaces protected from the weather. Maintain ambient temperatures between 50 and 90 degrees F.
- C. Store tiles on flat surfaces. Condition materials in spaces where they will be installed a minimum of 48 hours prior to installation.

1.5 PROJECT CONDITIONS

- A. Maintain a minimum temperature of 70 degrees F in spaces to receive tiles for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 degrees F.
- B. Do not install tiles until they have been conditioned to the space where they are to be installed.
- C. Close spaces to traffic during tile installation.

1.6 SEQUENCING AND SCHEDULING

- A. Do not deliver or install products until building is enclosed, wet work completed, and HVAC system is operating and maintaining temperature and humidity at occupancy level during remainder of construction period.
- B. Install tiles and accessories after other finishing operations, including painting, have been completed.
- C. Do not begin installation until concrete slabs have cured, dry, and able to bond with adhesive as determined by manufacturer.

1.7 EXTRA MATERIALS

- A. Furnish, not less than one box for each 50 boxes or fraction thereof, of each class, wearing surface, color, pattern and size of resilient floor tile installed.

1.8 WARRANTY

- A. Manufacturer's Warranty: Standard warranty covering manufacturing defects and installation integrity: Installation integrity is defined as products installed in accordance with the manufacturer's installation manual.
 - 1. Flooring: Five years minimum
 - 2. Base: One year minimum
- B. Installer's Warranty: Guarantee flooring and base installation against defects in installation, workmanship and loss of adhesion for one year.
- C. Warranty period begins on the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TILE AND ACCESSORIES

- A. Basis of Design:
 - 1. RF-1: Shaw Contract Pigment 0503V Stone 65115
- B. Substitutions: Where a basis of design has been specified, an equal or superior product may be accepted only upon review and written acceptance by the Architect and Interior Designer.
 - 1. Submit substitutions in accordance with Division 01 Section, Product Substitutions
 - 2. Include actual samples of floor tile (5 total) in addition to the Division 1 requirements
 - 3. All substitutions for floor tile shall have samples submitted within 30 days of the date of the Granted Maximum Price.

2.2 MISCELLANEOUS MATERIALS

- A. Adhesive: Recommended by manufacturer
 - 1. Install new LVT using epoxy based adhesive on existing concrete slabs which may not have a vapor barrier.
- B. Subfloor Filler: Portland cement-based latex underlayment; type recommended by flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where installation of tiles will occur. Do not proceed until unsatisfactory conditions have been corrected.

- B. Concrete Subfloors: Verify concrete slabs comply with ASTM F 710 and the following:
 - 1. Dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by tile manufacturer.
 - 2. Finishes of subfloors comply with tolerances and other requirements specified in Division 03 Section, Cast-In-Place Concrete for slabs receiving resilient flooring.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.
 - 4. Provide a 100 percent solids epoxy membrane over concrete substrates that do not meet the required moisture vapor transmission rate, as recommended by flooring manufacturer to maintain warranty conditions.

3.2 PREPARATION

- A. Comply with manufacturer's installation specifications to prepare substrates to receive tile.
- B. Use trowelable leveling and patching compounds per tile manufacturer's directions to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.
- D. Broom and vacuum substrates immediately before tile installation. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
- E. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.

3.3 INSTALLATION

- A. Comply with tile manufacturer's installation directions and other requirements indicated applicable to each type of tile installation scheduled.
- B. Lay out tile from center marks established with principal walls so tiles at opposite edges of room are of equal width. Adjust to avoid using widths less than half of a tile. Install tiles square with room axis, unless otherwise indicated.
- C. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles in pattern with respect to location of colors, patterns, and sizes as indicated on Drawings.
- D. Scribe, cut, and fit tiles to butt tightly to vertical surfaces, permanent fixtures, built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.

- E. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent marking device.
- G. Install tiles on covers for telephone and electrical ducts, and similar items occurring within finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers.
- H. Set tile to substrates without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed tile installation.
- I. Use full spread of adhesive applied to substrate in compliance with tile manufacturer's directions for trowel notching, adhesive mixing, and adhesive open and working times. Spray applied adhesives are not allowed.
- J. Hand roll tiles where required by tile manufacturer.

3.4 CLEANING AND PROTECTION

- A. Sweep, dust mop or vacuum the floor thoroughly to remove all loose dust, dirt, grit and debris.
- B. Remove any dried adhesive residue with a clean, white cloth dampened with mineral spirits, carefully following the warnings on the container.
- C. Damp mop the floor with a properly diluted neutral (pH 6 to 8) detergent solution.
- D. If necessary, scrub the floor using a rotary machine or auto scrubber with a properly diluted neutral detergent solution and the appropriate scrubbing brush (aggressiveness equivalent to 3M red pad for light scrub, 3M blue pad or equal for a deep scrub).
- E. Thoroughly rinse the entire floor with fresh, clean water. Remove rinse water and allow the floor to dry completely.
- F. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by tile manufacturer.
- G. Clean tiles not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean tiles using method recommended by manufacturer.

END OF SECTION 096519

SECTION 096536 - STATIC-CONTROL RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Static-dissipative, solid vinyl floor tile or vinyl composition floor tile.

- B. Related Requirements:

- 1. Section 096513 "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with static-control resilient flooring.

1.3 PREINSTALLATION MEETINGS

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

- 1. Review methods and procedures related to static-control resilient flooring including, but not limited to, the following:
 - a. Examination and preparation of substrates to receive static-control resilient flooring.
 - b. Installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: For each type of static-control resilient flooring. Include floor-covering layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

- 1. Show details of special patterns.
 - 2. Show locations of inscribed maintenance tiles.
 - 3. Submit grounding diagram showing location of grounding strips and connections.

- C. Samples for Initial Selection: For each type of static-control resilient flooring.

- D. Samples for Verification: For each type of static-control resilient flooring, of size indicated below:
 - 1. Floor Tile: Full-size units.
- E. Product Schedule: For static-control resilient flooring. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for static-control resilient flooring.
- C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of static-control resilient flooring to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for static-control resilient flooring.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups for static-control resilient flooring including resilient base and accessories.
 - a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store static-control resilient flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer but not less than 50 deg F or more than 90 deg F.
 - 1. Floor Tile: Store on flat surfaces.
 - 2. Sheet Floor Covering: Store rolls upright.

1.10 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive static-control resilient flooring during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during static-control resilient flooring installation.
- D. Close spaces to traffic for 48 hours after static-control resilient flooring installation.
- E. Install static-control resilient flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Static-Dissipative Properties: Provide static-control resilient flooring with static-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.
 - 1. Electrical Resistance: Test per ASTM F150 with 100-V applied voltage.
 - a. Average greater than 1 megohm and less than or equal to 1000 megohms when test specimens are tested surface to ground.
 - b. Average greater than 1 megohm and less than or equal to 1000 megohms when installed floor coverings are tested surface to ground.
- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 STATIC-DISSIPATIVE RESILIENT FLOOR COVERINGS

- A. Static-Dissipative, Vinyl Composition Floor Tile RF-2: ASTM F1066 (vinyl composition floor tile, nonasbestos formulated), Class 2 (through-pattern tile).
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong World Industries, Inc.
 - b. Johnsonite; a Tarkett company.
 2. Thickness: Not less than 0.125 inch.
 3. Size: 12 by 12 inches.
 4. Colors and Patterns: Armor Grey (AWI).

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified portland cement or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Grounding Strips: Provided or approved by manufacturer; type and size that maintains electrical continuity of floor-covering system to ground connection.
- C. Floor Polish: Provide protective, static-control liquid floor polish products as recommended by floor-covering manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion or static-control characteristics of floor coverings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of static-control resilient flooring and electrical continuity of floor-covering systems.
- B. Concrete Substrates: Prepare according to ASTM F710.
 - 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 floor-covering 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 manufacturer. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test according to ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative-humidity test using in situ probes according to ASTM F2170. Proceed with installation only after substrates have maximum 75 percent relative-humidity level measurement.
- C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
- D. 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.
- E. Do not install static-control resilient flooring until it is same temperature as space where it is to be installed.
 - 1. Move static-control resilient flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- F. Sweep and vacuum substrates to be covered by static-control resilient flooring immediately before installation.

3.3 INSTALLATION, GENERAL

- A. Install static-control resilient flooring according to manufacturer's written instructions.
- B. Embed grounding strips in static-control adhesive. Extend grounding strips beyond perimeter of static-control resilient floor-covering surfaces to ground connections.
- C. Scribe, cut, and fit static-control resilient flooring to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

- D. Extend static-control resilient flooring into toe spaces, door reveals, closets, and similar openings. Extend static-control resilient flooring to center of door openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on static-control resilient flooring as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- F. Install static-control resilient flooring on covers for telephone and electrical ducts, and similar items in installation areas. Maintain overall continuity of color and pattern with pieces of static-control resilient flooring installed on covers. Tightly adhere static-control resilient flooring edges to substrates that abut covers and to cover perimeters.
- G. Adhere static-control resilient flooring to substrates using a full spread of static-control 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.

3.4 FLOOR-TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so floor tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half floor tile at perimeter.
 - 1. Lay floor tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting floor tiles from cartons in same sequence as manufactured and packaged if so numbered. Discard broken, cracked, chipped, or deformed floor tiles.
 - 1. Lay static-dissipative, vinyl composition floor tiles with grain running in one direction.
- D. In each space where conductive, solid vinyl floor tile is installed, install maintenance floor tile identifying conductive floor tile in locations approved by Architect.
 - 1. Avoid cross seams.

3.5 FIELD QUALITY CONTROL

- A. Testing: Engage a qualified testing agency to test electrical resistance of static-control resilient flooring for compliance with requirements.
 - 1. Arrange for testing after static-control adhesives have fully cured and static-control resilient flooring has stabilized to ambient conditions and after ground connections are completed.
 - 2. Arrange for testing of static-control resilient flooring after performing floor polish procedures.

- B. Static-control resilient flooring will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of static-control resilient flooring.
- B. Perform the following operations immediately after completing static-control resilient flooring:
 - 1. Remove static-control adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect static-control resilient flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
 - 1. Do not wax static-control resilient flooring.
 - 2. If recommended in writing by manufacturer, apply protective static-control floor polish formulated to maintain or enhance floor covering's electrical properties; ensure static-control resilient flooring surfaces are free from soil, static-control adhesive, and surface blemishes.
 - a. Verify that both floor polish and its application method are approved by manufacturer and that floor polish will not leave an insulating film that reduces static-control resilient flooring's effectiveness for static control.
- D. Cover static-control resilient flooring until Substantial Completion.

END OF SECTION 096536

SECTION 096813 – CARPET

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Carpet tile
2. Sheet Carpeting
3. Accessories

1.2 SUBMITTALS

A. Product Data:

1. Printed data sheets for each type of carpet and accessory specified
2. Installation system proposed
3. Care, cleaning, and maintenance information. Include two copies of each of the following CRI publications:
 - a. “Steps in the right direction, an Owners Manual for Your Carpet” with pertinent treatment highlighted
 - b. Carpet Maintenance Guidelines for Commercial Applications
 - c. Take a Deep Breath and Thank Your Custodian; Tips and Tools for Improving IAQ in Schools
4. Smoke and flammability reports

B. Shop Drawings:

1. Working layout for each area to be carpeted. Include location of accent tile.
2. Show pattern, color, trim units, and other pertinent installation details
3. Maintenance training video

C. Samples:

1. Manufacturers standard color books of actual samples
2. Manufacturers standard trim chain
3. Three full size samples of each carpet tile pattern submitted
4. Three 12-inch long strips of each trim unit submitted

D. Certifications and Testing:

1. Provide certification that tile has been manufactured in accordance with the Contract Documents.
2. Traffic Appearance Retention Rating (TARR) documentation
3. Test results of the Bond and Moisture tests
4. Test results from the Calcium Chloride tests

E. Sustainable Design Submittals:

1. Product Data:
 - a. For carpet tile, documentation indicating compliance with testing and product requirements of CRI's "Green Label Plus" program.
 - b. For installation adhesive, documentation including printed statement of VOC content.
2. Laboratory Test Reports: For carpet and installation adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Preinstallation Meeting minutes

G. Sample Warranty

1.3 QUALITY ASSURANCE

- A. Commitment to Sustainability: Carpet manufacturer shall have an operational carpet-recycling program for 100 percent of the new carpet product (at the end of its useful life). This program shall not consist of incineration.
- B. Contractor's Qualifications:
 1. Employ only experienced installers, skilled in installation of the specified systems.
 2. Installation company shall employ a minimum of three qualified installers with a minimum of three years experience each of installing similar systems.
- C. Manufacturer's Qualifications:
 1. Employ only manufacturers making the specified materials as a current production item.
 2. Manufacturers shall have a minimum of five years of production experience with carpet of similar types to that specified.
- D. Source Limitations: Obtain carpet from a single source, unless otherwise directed by Architect.

- E. Install carpet after building is enclosed, wet work complete, and HVAC system operational.
 - 1. Maintain temperature and humidity at designed level for the remainder of the construction period.
- F. Carpeting shall have a minimum critical radiant flux of 0.45 watts per square centimeter (radiant panel test) per ASTM E648 "Standard Test Methods for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source."
- G. Carpeting shall meet a minimum TARR rating 3.0 for Heavy Traffic
- H. Carpet Fire-Test-Response Characteristics: Provide carpeting with the following characteristics as determined by testing identical products per test method indicated below by U.L. or another nationally recognized testing laboratory acceptable to the authorities having jurisdiction. Identify carpet with appropriate markings of applicable agency.
 - 1. Surface Flammability: Passes CPSC 16 CFR, Part 1630
 - 2. Flam Spread 25 or less per ASTM E 84
 - 3. Smoke Density: 450 or less per ASTM E 84
 - 4. Static: Under 3.5 kv. Below the average level of human sensitivity
- I. Adhesives: VOC levels shall comply with Division 07 Section, Joint Protection.
- J. Carpet shall have been tested against and passed the CRI Green Label Plus Program.
- K. Calcium Chloride Test: Measure moisture vapor emissions from concrete slab prior to the installation of the carpeting. Maximum moisture emissions levels shall be as recommended by the carpeting manufacturer.
- L. Bond and Moisture Tests: Provide bond and moisture tests prior to the installation of the carpet. Tests shall be in accordance with the carpet manufacturer's recommendations. Provide amount of tests as recommended by the carpet manufacturer.
- M. The Architect may send samples of materials, taken at random from the jobsite, to an independent testing laboratory. The cost of testing shall be borne by the contractor if the material is found non-compliant with specifications.
- N. Preinstallation Meeting: Hold a Preinstallation meeting after the field tile has been installed, prior to the accent tile installation. Provide 72 hours' notice. Meeting to include the Architect, Owner and Carpet installer. Architect will provide an agenda prior to the meeting.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in the original factory packaging, labeled with identification of manufacturer, brand name, lot number, and test data.

- B. Store materials on site, in original packaging, inside a well ventilated area protected from weather, moisture, soilage, extreme temperatures, and humidity.

1.5 PROJECT CONDITIONS

- A. Dimensions on Drawings are approximate. Field verify dimensions and other conditions affecting Work.

1.6 EXTRA STOCK

- A. Carpet Tile: Full-size units equal to 10 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.7 WARRANTIES

- A. Manufacturer's Warranty:
 - 1. Warranty shall be non-prorated against surface pile wear, zippering, edge ravel, excessive static, loss of resiliency, tough bind, moisture barrier (passes British Spill Test), and delamination of secondary backing.
 - 2. Surface pile wear for warranty purposes shall be no more than 10% loss of face fiber.
 - 3. Warranty shall be for a minimum of twenty years.
- B. Installer's Warranty: Guarantee the installation against defects in workmanship, seaming, and loss of adhesion for a period of three years.
- C. Warranties shall begin on the date of Substantial Completion.
- D. Upon written notice from the Architect, correct or replace improper work and material that may become apparent within the warranty period. Repairs will be made in accordance with this specification.
 - 1. Exception: Any problems arising from improper adherence to the manufacturer's recommended maintenance program.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design:
 - 1. Patcraft

- B. Substitutions: Where a basis of design has been specified, an equal or superior product may be accepted only upon review and written acceptance by the Architect and Interior Designer.
1. Submit substitutions in accordance with Division 01 Section, Product Substitutions
 2. Include actual samples of proposed carpet tile patterns (5 total) in addition to the Division 1 requirements
 3. All substitutions for carpet tile shall have samples submitted within 30 days of the date of the Granted Maximum Price.

2.2 CARPET TILE CPT-1

- A. Color: Axial 00100.
- B. Pattern: Run IO466.
- C. Fiber Content: 100 percent nylon 6.
- D. Fiber Type: EcoSolution Q Nylon.
- E. Pile Characteristic: Level-loop pile.
- F. Density: 6,506 oz./cu. yd.
- G. Stitches: 10 stitches per inch
- H. Gauge: 1/10 ends per inch
- I. Total Weight: 15 oz./sq. yd. for finished carpet tile.
- J. Primary Backing/Backcoating: Manufacturer's standard composite materials.
- K. Backing System: EcoWorx Tile.
- L. Size: 12 x 48 inches.
- M. Applied Treatments:
1. Soil-Resistance Treatment: Manufacturer's standard treatment.
 2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:
 - a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

- N. Performance Characteristics:
1. Appearance Retention Rating: Severe traffic, 3.5 minimum according to ASTM D7330.
 2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
 3. Dry Breaking Strength: Not less than 100 lbf according to ASTM D2646.
 4. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.
 5. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
 6. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
 7. Electrostatic Propensity: Less than 3.5kV according to AATCC 134.
- O. Metal Transition edges: Provide a metal transition edge between two distinct level materials, and between two distinct materials at different levels.
1. Schluter Reno-U: between carpet and substrate. Not to exceed 1/2 inch height change.
 2. Schluter Scheine: between tile and carpet of level height.
- P. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.

2.3 TUFTED CARPET

- A. Color: Axial 00100.
- B. Pattern: Intercept IO486.
- C. Fiber Content: 100 percent nylon 6.
- D. Fiber Type: EcoSolution Q Nylon.
- E. Pile Characteristic: Level-loop pile.
- F. Density: 6750 oz./cu. yd.
- G. Stitches: 12 per inch.
- H. Gauge: 1/10 ends per inch.
- I. Total Weight: 18 oz./sq. yd. for finished carpet.

- J. Primary Backing: Manufacturer's standard material] [Woven polypropylene.
- K. Secondary Backing: Manufacturer's standard material
- L. Backing System: Ultraloc.
- M. Roll Width: 12 feet.
- N. Applied Treatments:
 - 1. Applied Soil-Resistance Treatment: Manufacturer's standard material.
 - 2. Antimicrobial Treatment: Manufacturer's standard material.
 - a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
- O. Performance Characteristics:
 - 1. Appearance Retention Rating: Severe traffic, 3.5 minimum according to ASTM D7330.
 - 2. Dry Breaking Strength: Not less than 100 lbf according to ASTM D2646.
 - 3. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
 - 4. Electrostatic Propensity: Less than 3.5kV according to AATCC 134.
- P. Resilient Transition edges: Provide a resilient transition edge between two distinct level materials, and between two distinct materials at different levels.
- Q. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
 - 1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Examine substrate for compliance with the Contract Documents. Do not proceed until unsatisfactory conditions have been corrected.

- B. Remove subfloor coatings, including curing compounds, dust, dirt, solvents, soaps, silicone, wax, oil, grease, paint, plaster, and other substances that are incompatible with adhesives. Allow floors to dry. Apply sealer to prevent dusting.
- C. Ensure concrete floors are free from cracks, ridges, depressions, scaling and irregularities.
- D. Ensure constant floor height after installation with a maximum variation of 1/4-inch per 10 feet non-cumulative in any direction.

3.2 INSTALLATION

- A. Install carpet system in accordance with manufacturer's recommendations.
 - 1. Carpet coverage shall be complete to edges of space and free of gaps between tiles and at bases of permanent fixtures within designated areas.
 - 2. Install using direct glue-down method. Comply with CRI 104, Section 8, Direct Glue-Down Installation
- B. Check matching of carpet before cutting and ensure no visible variation between dye lots.
- C. Cut carpet in a manner to allow proper seam and pattern match. Ensure cuts are straight, true, and not frayed.
- D. Adhesive: Prime substrate as recommended by adhesive manufacturer. Spread adhesive at stipulated rates for full adhesion.
- E. Install trims where carpet terminates at other floor coverings. Use full-length pieces only. Where splicing cannot be avoided, butt ends tight and flush.
- F. Install tile to be free of air pockets.
- G. Do not place heavy objects such as furniture on carpeted areas for a minimum of 24-Hours after completed installation or until adhesive is set.
- H. Separate waste in accordance with the Waste Management Plan. Manufacturer to reclaim all scrap not retained by Owner.

3.3 CLEANING AND PROTECTION

- A. All scrap carpet shall be palletized and returned to the manufacturer.
- B. Immediately after installation, remove visible cement, dirt, wrappings, cartons, clippings, and other foreign substances. Vacuum carpet.
- C. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer until the Date of Substantial Completion.

- D. Conduct an instruction class for the Owner's maintenance staff prior to the Date of Substantial Completion.
1. Instruct personnel on the proper method of cleaning the material as recommended by the manufacturer.
 2. Videotape this session.

END OF SECTION 096813

SECTION 097723 - FABRIC-WRAPPED ACOUSTICAL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes shop and site fabricated, fabric-wrapped acoustical wall panels.
- B. Related Sections:
 - 1. Refer to Finish/Color Schedule on Drawings for Fabric selection.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include fabric facing panel edge, core material, and mounting indicated.
- B. Shop Drawings: For panel assembly and installation.
 - 1. Include plans, elevations, sections, and mounting devices and details.
 - 2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
 - 3. Include details at cutouts and penetrations for other work.
 - 4. Include direction of fabric weave and pattern matching.
- C. Samples for Initial Selection: For each type of fabric facing.
 - 1. Include Samples of hardware and accessories involving color or finish selection.
- D. Samples: Submit 8-by-11-inch unit of each type of acoustical panel required. Include samples of installation devices and accessories.
- E. Acoustical test reports from an independent acoustical testing laboratory.
 - 1. All tests shall be performed by an independent acoustical testing laboratory. The acoustical testing laboratory shall have been accredited by the U.S. Department

of Commerce, National Bureau of Standards under the National Voluntary Laboratory Accreditation Program (NVLAP) for this test procedure.

2. All sound absorption measurements shall be made in accordance with ASTM C423 (sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method). Tests shall be made in a type A mounting, as described in ASTM E795 (Practices for Mounting Test Specimens during Sound Absorption Tests).

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Electrical outlets, switches, and thermostats.
 2. Items penetrating or covered by panels including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Alarms.
 - d. Sprinklers.
 - e. Access panels.
 - f. Other items shown on the project drawings.
 3. Show operation of hinged and sliding components covered by or adjacent to panels.
- C. Product Certificates: For each type of panel.
- D. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of panel to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Fabric: For each fabric, color, and pattern installed, provide length equal to 10 percent of amount installed, but no fewer than 10 sq. yd., full width of bolt.

2. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices, including unopened adhesives.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing acoustical panels similar to those indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations for Acoustical Panels: Obtain acoustical panels from one source with resources to provide products of consistent quality in appearance and physical properties.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and panels in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.
- C. Protect panel edges from crushing and impact.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install panels until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Air-Quality Limitations: Protect panels from exposure to airborne odors such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.
- C. Field Measurements: Verify panel locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace panels and components that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Fabric sagging, distorting, or releasing from panel edge.
 - b. Warping of core.
 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fabric-wrapped wall panels from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Panels shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

2.3 SOUND ABSORPTIVE WALL AND CEILING PANELS

- A. General: Fabric wrapped sound absorbing wall and ceiling panels shall be provided. Panels shall be typically 2" glass or mineral fiber core with a density of 3 to 5 PCF.
- B. Acceptable Manufacturers: Subject to compliance with requirements, provide systems by one of the following:
1. Decoustics, Ltd.
 2. Kinetics, Noise Control, Interiors Division.
 3. Conwed Design Scape.
 4. MBI Products Company
- C. Core Materials: Manufacturer's standard, typically 5pcf fiberglass or mineral fiber.
- D. Mounting Devices: Concealed on back of panel, recommended by manufacturer to support weight of panel, and as follows:
1. Retain one or more of 12 subparagraphs below to suit Project. Combination attachment systems are also available from manufacturers; insert if required.
 2. Splines: Manufacturer's standard concealed metal or plastic splines that engage the kerfed edges of the panel, with other moldings and trim for interior corners, exterior corners, and exposed edges, with factory-applied finish on exposed items.

3. Metal Clips or Bar Hangers: Manufacturer's standard two-part metal "Z" clips, with one part of each clip mechanically attached to back of panel and the other part to substrate, designed to permit unit removal.
- E. Other Manufacturers: Subject to compliance with requirements for the Project, materials by other manufacturers must match material composition, color, pattern, size, and other characteristics as acceptable to Architect. Architect shall be the sole judge of acceptable matching materials.
- F. The sound absorption provided by the panel shall meet or exceed the values tabulated below in each octave band:

Thickness	Frequency (Hz)					
	125	250	500	1000	2000	4000
2 inch	0.16	0.70	0.95	0.95	0.95	0.95

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated panels, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting panel performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panels in locations indicated. Unless otherwise indicated, install panels with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of panels using type of mounting devices indicated. Mount panels securely to supporting substrate.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch in 48 inches, noncumulative.
- B. Variation of Joint Width: Not more than 1/16 inch wide from hairline in 48 inches, noncumulative.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.

- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 097723

SECTION 099000 – PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes painting and finishing work.
- B. The Architect shall not be limited in the number of colors selected for single space or for the complete Project.
- C. Refer to Finish/Color Schedule on Drawings for color and finish.

1.2 DEFINITIONS

- A. The terms “paint”, “protective coating”, etc. include paints, special coatings, stains, sealers, fillers, and other types of coatings and coating materials whether used as primers, barrier, intermediate, or finish coats individually or as a system.
- B. Exposed Surfaces: Surfaces exposed to view when permanent or built-in fixtures, covers, grilles, mechanical and electrical equipment housings, ducts and conduits, are in place; surfaces in back of movable equipment and furniture; and interior surfaces of ducts visible through grilles, interior surfaces visible through equipment covers, and blank-off panels.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Materials List: An inclusive list of required coating materials. Indicate each material and cross reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 1. Prepare coating systems schedule proposed on the basis of the surfaces, types of materials, and their dry film thickness. List the name and product number for the products proposed for each use.
 - 2. This shall in no way be construed as permitting substitution of materials for those specified or approved for this Work by the Architect.
- C. Color Chip Catalog: Provide Architect with a complete current color chip catalog from which colors may be selected. Manufacturers may fulfill this requirement by updating catalog that Architect may presently have in his possession.
- D. Draw Downs: Two 9 x 9 inch samples of each selected color and texture.

- E. Manufacturer's Recommendations: In each case where material proposed is not the material specified or specifically described as an acceptable manufacturer in this Section of these Specifications, submit for the Architect's review the current recommended method of application published by the manufacturer of the proposed material.
 - 1. Manufacturer Inspection report showing the substrate has been reviewed; is properly prepared, and compatible for the scheduled coating system.
- F. Sample warranty

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.
 - 1. Applicator shall have minimum two years combined experience painting:
 - a. Exterior surfaces with theme applications, following art director's lead.
 - b. Interior renovation work with extensive existing coating systems.
- B. Single Source Responsibility: Provide primers and undercoat materials produced by the same manufacturer as the finish coats.
 - 1. Do not mix products from differing manufacturers unless specifically permitted and accepted in writing by the involved manufacturers. Such acceptance shall not affect printed recommendations or warranties. Provide such acceptances prior to commencing work.
- C. Material Quality: Provide the manufacturer's best quality materials of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be accepted.
- D. Applicator: Company specializing in commercial blast cleaning and painting, with at least five years' experience under the same name, and three projects of equal size and comparable scope using identical generic coating types.
 - 1. Applicator for metal work to have blast cleaned two projects to SSPC SP5, SP6 or SP10 specifications within the past two years.
- E. Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
- F. Codes and Standards: In addition to complying with pertinent codes and regulations, comply with the Painting and Decorating Contractors of America (PDCA) in their "PDCA Industry Standards" unless more stringent requirements are specified in the Contract Documents.

G. Environmental Requirements:

1. VOC emissions from architectural paints and coatings shall not exceed the VOC and chemical component limits of Green Seal Standard GS-11 requirements.
 - a. Non-flat 150 g/l
 - b. Flat 50 g/l
 - c. Exceptions: Specialty coatings where durability is the dominant priority.
 - 1) Shower rooms with epoxy paint system
 - 2) Restrooms with epoxy paint
2. VOC emissions from Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates shall not exceed the VOC content limit of 250 g/L established in Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 07, 1997.
3. All coatings including clear wood finishes, floor coatings, stains, primers, sealers, and shellacs applied to interior elements must not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on February 5, 2016.
4. Paints shall be manufactured without the use of any formaldehyde precursors.

1.5 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- B. Do not apply materials when the surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer
- C. Do not apply exterior coating during rain or when relative humidity is outside the humidity ranges required by the paint product manufacturer
- D. Provide adequate lighting during the application of any coating system, minimum level shall be that level that will be required for the intended use of the space.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver paint materials to the job site in their original unopened containers with labels intact and legible at time of use.
- B. Store materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in well ventilated area.
 1. Provide a 10B:C fire extinguisher in the immediate vicinity of the storage area.
 2. Store only the approved materials at the job site and store only in a suitable and designated area restricted to the storage of paint materials and related equipment.

3. Use means necessary to ensure the safe storage and use of paint materials and the safe disposal of waste.

1.7 EXTRA STOCK

- A. Deliver to the Owner 1 gallon of extra stock of each type, color, and gloss of material used. Deliver sufficient unmixed proportions of multi component materials to make minimum 1 gallon of each.
- B. Furnish extra paint materials from the same production run as the materials applied in the Work. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents including location of application.
 1. Furnish multi component materials in correct proportions for mixing and label parts respectively.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Reference Material list on sheet A12.0 for Basis of Design manufacturers, finish and color selection.
- B. Products specified are those known suitable for this type of work and are based on products shown on the schedules at the end of this section and require no further approval as to manufacturer or catalog number.
 1. Substitution requests shall include manufacturer's literature for each proposed product giving the name, generic type, descriptive characteristics, and independent testing laboratory certification for meeting or exceeding characteristics as listed on data sheets from the design basis products. Systems subject to Architect's approval.
 2. Substitute products shall be the highest quality grade of the various types of materials regularly manufactured by the manufacturer for indicated substrates. Substitute products may have to be a different generic type to provide performance comparable to that specified. Materials not displaying the manufacturer's identification as the highest-grade product, or not recommended by the manufacturer's lab as the best and most suitable product will not be accepted.
 3. Substitutions which propose decrease the film thickness or fail to meet any of the performance or other characteristics of the design basis materials will not be considered.
- C. Other Acceptable Manufacturers:
 1. Benjamin Moore & Company
 2. Coronado Paint
 3. Duro Paints & Wall Coverings
 4. Devco High Performance Coatings

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5. MAB Paints, M.A. Bruder & Sons, Inc.
6. Pratt and Lambert
7. Glidden Professional

D. Products of the following manufacturers are acceptable as equal to Tnemec, providing their products equal or exceed the quality specified.

1. Carboline Company
2. Amercoat by Arkema (Previously Ameron)
3. Sherwin-Williams

2.2 MATERIALS

A. Coatings: Ready mixed, except field catalyzed coatings. Prepare pigments:

1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating
2. For good flow and brushing properties
3. Capable of drying or curing free of streaks or sags
4. Interior materials furnished shall produce a surface having a Class A rating for flame, fuel, and smoke.

B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.

C. Material Compatibility: Provide primers, finish coat materials, equipment, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

1. Coordinate primed or pre-finished products specified elsewhere in these Specifications, assuring compatibility of the total systems.
2. Provide barrier material over suspected noncompatible substrates as recommended by coatings manufacturer. If performance of specified finish system will be compromised due to incompatibility, remove the noncompatible finishes and re-prime. Barrier coat, removal and re-priming to be at no additional cost to Owner.
3. Thinners shall be only those thinners recommended for that purpose by the manufacturer of the material to be thinned.

D. Materials not specifically indicated but required for preparation, application, or clean-up shall be of high grade commercial quality.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions under which painting work is to be applied. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Starting of painting work will be constructed as Applicator's acceptance of surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint surface.
- D. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- E. Test shop applied primers for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the maximums as recommended, for the types of coatings to be used, by the manufacturer.
- G. Measure pH level in concrete and stucco surfaces for compliance with manufacturer's compatible recommendations.
- H. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

3.2 SURFACE PREPARATION

- A. General
 - 1. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions, and as specified, for each substrate condition.
 - 2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place prior to surface preparation and painting operations. Following completion of painting of each space or area, reinstall removed items.
 - a. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 3. Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning. Program cleaning and painting so that contaminants from cleaning process will not fall onto wet, newly painted surfaces.

- B. Provide barrier coats over incompatible primers or remove and re-prime.
 - 1. Shellac and spot prime with industry accepted “stain killers” at all marks or stains which may bleed through final finishes.
- C. Before applying succeeding coats, primers and undercoats shall be integral and shall function as intended. Touch up all scratches, abrasions and other disfigurements and remove any foreign mater before proceeding with the following coat. All spot-priming or spot-coating shall be feathered into adjacent surfaces for a smooth final surface.
- D. Do not apply final coats until other work with operations that would be detrimental to finish coats has been completed in that area.
- E. When the manufacturing of paint supplied does not require or recommend a primer, and a single coat will provide required coverage, approval from the Architect must be obtained to delete second coat; and a credit shall be due the Owner.
- F. Unprimed Steel and Iron Surfaces: Use more stringent cleaning methods from material manufacturer or SSPC for substrate and finish system.
 - 1. Remove dirt, grease, oil, foreign matter, and contaminates by means of chemical or solvent cleaning (SSPC SP-1). Remove residue prior to coating. Surfaces must be clean and dry at the time of hand, power tool, or abrasive blast cleaning.
 - 2. Hand Tool Cleaning, SSPC SP-2: Use hand methods such as wire brushing, chipping, sanding, scraping, and similar abrasive or impact types of tools.
 - 3. Power Tool Cleaning, SSPC SP-3: Use power-operated brushes, chipping hammers, scalers, sanders, grinders, and similar abrasive or impact types of equipment.
 - 4. Abrasive blast cleaning, SSPC SP-6: Use a closed captured abrasive blast cleaning system to remove rust, rust scale, milscale, previous coatings, etc. The preparation shall impart a profile of between 1.5 and 2.5 mils.
 - 5. Brush-off Blast Cleaning, SSPC SP-7: Remove all visible oil, grease, dirt, loose rust and loose paint by compressed air nozzle blasting, centrifugal wheels or other specific method. The preparation shall impart a profile of about 1.0 mill on galvanized or non-ferrous metals.
 - 6. Prime cleaned areas prior to flash rusting, but no later than the same day. If the cleaned surfaces become contaminated prior to priming by hand prints, oil, grease, or other foreign matter, they shall be solvent cleaned and re-cleaned as appropriate.
- G. Shop Primed Steel and Iron Surfaces: Areas that have had shop prime coat damaged are to be re-prepared by receiving a power tool cleaning (SSPC SP-3), or abrasive blast cleaning (SSPC SP-6) for the respective surface and coating involved. Feather edges to make touch-up patches inconspicuous.
- H. Welds: Prepare welds by removing oils, greases, foreign matter, and contaminates in accordance with SSPC SP-1. Remove weld spatter, slag, and flux deposits. Grind surface to a smooth transition. Power tool clean or abrasive blast clean, depending on surface and finish system, areas to adhere primer but not less than 2-inches from the weld.

- I. Galvanized Surfaces: Remove surface contamination, oils, and other residuals, and wash with solvent in accordance with SSPC SP-1. Pretreat in accordance with SSPC PT-2 or apply primer recommended by manufacturer.
- J. Concrete and Masonry Surfaces:
 - 1. Remove loose particles, sand, and other contaminants. Test for alkalinity and moisture content.
 - 2. Do not paint surfaces where moisture content or alkaline level exceeds that permitted in manufacturer's written instructions.
 - 3. Remove laitance, efflorescence, form oil, curing compounds, scale, salt or alkali powder, mold, mildew, and other foreign matter by methods recommended by coatings manufacturer. Rinse with fresh water. Allow to dry.
 - 4. Correct any alkalinity imbalance that may be detrimental to the coating system's performance.
 - 5. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - 6. Fill voids, honey-combs, pin holes, and tie holes with flexible epoxy or polymer modified cementitious patching compound.
- K. Wood Surfaces: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Seal knots, pitch streaks and sappy sections. Fill nail holes and other indentations with putty, flush with adjacent surfaces after primer has dried. Sand wood surfaces smooth with 100 grit sandpaper and remove dust.
 - 1. Treat surfaces of open-grained woods with paste filler. Thin paste filler to brushing consistency and apply in two coats, with stiff, short-bristled brush. Allow filler to dry. Rub surface across the grain with coarse burlap or 3-M pads until the surplus filler is removed.
 - 2. Scrape and clean small, dry, seasoned knots and apply a thin coat of shellac or other recommended knot sealer before application of primer. Sand smooth when dried.
 - 3. Prime, stain, or seal wood to be painted immediately upon delivery.
 - a. Do not allow wood to weather more than three days (72 hours) before priming. If three days have passed, wood surface must be scrub sanded with 80 and 100 grits.
 - b. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
 - 4. When transparent finish is required, backprime with spar varnish.
- L. Gypsum Board Surfaces:
 - 1. Fill minor defects with filler compound and spot prime defects after repair.
 - 2. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Finish smooth and flush with adjacent surfaces.
 - 3. Do not begin paint application until finishing compound is dry and sanded smooth.

- M. Non-Compatible Finishes: Materials or equipment with non-compatible factory finishes shall receive an application of an intermediate or barrier material as required by the manufacturer of finish product. If performance of specified finish system will be compromised due to incompatibility, Architect reserves the right to require removal of factory primer or finish, and application of a new compatible primer. Additional work and materials required by non-compatible finishes shall be provided at no additional cost to Owner.

3.3 MATERIALS PREPARATION

- A. Mix and prepare painting materials in accordance with manufacturer's written instructions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

3.4 APPLICATION

- A. General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint, until paint film is of uniform finish, color, and appearance. Give special attention to insure that surfaces including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 - 2. Apply material only to clean, dry surfaces and during periods of favorable weather unless otherwise allowed by the manufacturer.
 - 3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.
 - 4. Paint front and back sides of access panels and removable or hinged covers to match exposed surfaces.
 - 5. Seal top and bottom edges of wood doors with two coats of shellac or other effective sealer immediately upon delivery of doors to Site and after trimming to size.
 - 6. Finish exterior doors on tops, bottoms, and side edges same as exterior faces unless otherwise indicated.
 - 7. Sand lightly between each succeeding enamel or varnish coat.
- B. Take dry bulb and wet bulb temperature readings when preparing and coating metal surfaces. Do not proceed if conditions are not within the recommended or specified tolerances.
- C. Use a tack rag to tack off all gypsum walls prior to priming.
- D. Brush or roll out and work materials onto surfaces in an even film, free of marks.

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- E. Spray Application: Utilize spray application on metal surfaces where hand brush work would be inferior.
 - 1. Each application shall provide the equivalent hiding of brush-applications. Do not double back with spray equipment for the purpose of building up film thickness in one pass.
 - 2. Backroll all applications on stucco surfaces.
- F. Make each application to provide a uniform finish, distinctively darker than the proceeding. Make edges adjoining other materials or colors sharp and clean, without overlapping. Sand between applications with fine sandpaper or rub surfaces with pumice stone in accordance with manufacturer's directions, where required to produce a smooth even finish.
- G. Scheduling Painting: Apply first coat material to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
 - 1. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
 - 2. Slightly vary the color of succeeding coats.
- H. Paint Film Thickness: Make as many applications of material as necessary to obtain the minimum dry film thickness recommended by the manufacturer. Rate of application shall not exceed manufacturer's recommendations for each coat.
- I. Prime Coats: Apply prime coat of material which is required to be painted or finished and which has not been prime coated by others.
 - 1. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn through or other defects due to insufficient sealing.
 - 2. Coordinate manufacturer's prime coats with finish coats as specified herein. If compatibility is not ascertained during the bidding period, and verification submitted with the shop drawings, then prime coat paint system as specified herein shall be applied to the item prior to finish painting as specified herein.
- J. Pigmented Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
 - 1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

3.5 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Paint shop primed equipment. Paint shop finished items when shop finish is damaged. Galvanized items are not considered pre-finished and are to be painted when visible (outside mechanical/electrical closets).
- B. Prime and paint insulated and non-insulated pipes, conduit, boxes, insulated and non-insulated ducts, hangers, brackets, collars and supports exposed to view.
- C. Prime and paint exposed to view mechanical and electrical equipment occurring in finished areas, in addition to manufacturers paint finish if any.
 - 1. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, nonspecular black paint.
 - 2. Refer to Mechanical and Electrical Sections for schedule(s) of stencil identification and banding for equipment, ductwork, piping, and conduit in accordance with ANSI requirements. Consult Architect for resolution of color or identification conflicts.
- D. Paint both sides and edges of plywood backboards for electrical and telephone equipment with fire-retardant finish before installing backboards or equipment.

3.6 FIELD QUALITY CONTROL

- A. Work is subject to inspection by the Architect, Owner, or their representative(s) at any time.
 - 1. Owner may engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Site will be taken, identified, sealed, and certified in presence of Contractor.
- B. The coating thickness shall be determined by the use of a properly calibrated “Nordson-Microtest” or “Elcometer” dry film thickness gage, or “Tooke gage”. Keep one of these instruments on the Site with calibration equipment, for field quality control purposes and for use by the Architect, Owner, or their representative(s). Use selected instrument frequently to maintain proper control on film thickness.
- C. Refinish whole wall where portion of finish has been damaged or is not acceptable.

3.7 CLEAN-UP AND PROTECTION

- A. Remove from Site discarded paint materials, rubbish, cans, and rags at end of each work day.
- B. Upon completion of painting work clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

- C. 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. Provide "Wet Paint" signs as required to protect newly painted finishes.
- D. At the completion of Work of other trades, touch-up and restore damaged or defaced painted surfaces.

3.8 PAINT TYPES AND NUMBER OF COATS

- A. The following schedules are intended to identify the type of finishes which are required for the various surfaces, and to identify the surfaces to which each finish is to be applied.
 - 1. Where the substrate has a compatible and satisfactory prime coat already on it, the prime coat specified for the numbered finish may be omitted. Test prime coat for compatibility before applying additional coats.
 - 2. When the manufacturing of paint supplied does not require or recommend a primer, and a single coat will provide required coverage, approval from the Architect must be obtained to delete second coat; with a credit.
- B. To define requirements for quality, function, and textures, the following list of materials designates the manufacturer's brand, types, and other requirements to conform to the requirements of this Project.

3.9 EXTERIOR PAINTING SCHEDULE

- A. Concrete Block:
 - 1. Acrylic Latex Finish
 - a. Primer: Applied at spreading rate recommended by manufacturer.
 - 1) Sherwin-Williams: PrepRite Block Filler (B25W25)
 - 2) Glidden Professional: Concrete Coatings Block Filler Interior/Exterior Primer (3010)
 - 3) Benjamin Moore Super Spec Block Filler 206
 - 4) PPG 6-7 SpeedHide® Int/Ext Masonry Block Filler Latex
 - 5) Coronado SuperKote 5000 958-11 Block Filler
 - b. Surfacer: Applied at spreading rate recommended by manufacturer.
 - 1) Sherwin-Williams: Loxon Block Surfacer (A24W200)
 - 2) Glidden Professional: Gripper Interior/ Exterior Block Surfacer (3100)
 - 3) Benjamin Moore Super Spec Block Filler 206
 - 4) PPG 6-610 Series SpeedHide® Exterior Flat Acrylic Latex
 - 5) Coronado Coronado Supreme Semi-Gloss (12-1)

- c. Second and Third Coats or Top Coat: Applied at spreading rate recommended by manufacturer.
 - 1) Sherwin-Williams: A-100 Exterior Latex Gloss (A8)
 - 2) Glidden Professional: ULTRA-HIDE 150 Exterior Acrylic Semi-Gloss Finish (2416v)
 - 3) Benjamin Moore Ultra Spec EXT Gloss N449
 - 4) PPG 6-900 Series SpeedHide® Exterior House and Trim Semi-gloss Acrylic Latex
 - 5) Coronado Coronado Supreme Semi-Gloss (12-1)
- d. Surfaces: CMU. Delete block filler at split faced units

B. Ferrous Metal (Not HM Doors and Frames):

1. High-Build Acrylic Polyurethane Enamel:

- a. Primer: Metal primer applied at spreading rate recommended by the manufacturer.
 - 1) Tnemec: Poxiprime Series N69
 - 2) S/W: Recoatable Epoxy Primer (B67 Series)
 - 3) Devoe HP Coating: Devran 223 Universal Epoxy Prime
 - 4) Benjamin Moore: Corotech V150 Epoxy Primer
- b. Second Coat: Epoxy intermediate coat applied at spreading rate recommended by the manufacturer.
 - 1) Tnemec: Series 66 Hi-Build Expoxoline
 - 2) S/W: Acrolon 218 HS with SG Hardner (B65 Series)
 - 3) Devoe HP Coating: Bar Rust 231 Multi-Purpose Epoxy Mastic (231KXXXX)
 - 4) Benjamin Moore: Corotech V160 Epoxy Mastic
- c. Third Coat: Semigloss, acrylic polyurethane enamel applied at spreading rate recommended by the manufacturer.
 - 1) Tnemec: Series 1075 Endura-Shield
 - 2) S/W: Acrolon 218 HS with SG Hardner (B65 Series)
 - 3) Devoe HP Coating: Devthane 378 Aliphatic Urethane Semi-Gloss Enamel (378KXXXX)
 - 4) Benjamin Moore: Corotech V510 Aliphatic Urethane
- d. Surfaces: Lintels, handrails and railings, bumper posts, and all structural and miscellaneous exposed steel.
- e. Hollow metal doors and frames to have system specified below.

- f. Primer may not be required on shop primed items where compatibility is confirmed in writing with the manufacturer of the type of shop primer being applied. Verify this during the bidding period, and if primer is not compatible, then primer shall be either field applied or shop applied with type as recommended by the finish coat manufacturer. Type of primer and surface preparation shall be as recommended by the painting materials manufacturer.
- g. Steel with a galvanized coating may require additional preparatory coat prior to priming. Coordinate with manufacturer.
- h. This paint system shall be spray applied only, brush application is not allowed.

C. Ferrous Metal (HM Doors and Frames):

1. Alkyd Enamel:

- a. Primer: Metal primer applied at spreading rate recommended by the manufacturer.
 - 1) Sherwin-Williams: Kem Kromik Universal Metal Primer B50Z Series
 - 2) Duron Universal Phenolic Alkyd Fast Dry Metal Primer
 - 3) Devoe HP Coating: Devgard Rust Penetrating Alkyd Metal Primer (4160/4360)
 - 4) Benjamin Moore Alkyd Metal Primer P06
 - 5) Insl-x Corotech V140 Alkyd Metal Primer
- b. Second and Third Coat: Semigloss, enamel applied at spreading rate recommended by the manufacturer.
 - 1) Sherwin-Williams: Industrial Enamel, B54 Series.
 - 2) Devoe HP Coating: Devguard Alkyd Gloss Enamel (4308)
 - 3) Benjamin Moore DTM Alkyd Semi-Gloss P24
 - 4) Insl-x Corotech V201 Urethane Alkyd S/G Enamel
- c. Surfaces: Hollow metal doors and frames.
- d. Paint both interior and exterior side of hollow metal doors and frames.
- e. Primer may not be required on shop-primed items. Confirm in writing with the manufacturer of the type of shop primer being applied. Surface preparation shall be as recommended by the painting materials manufacturer.

3.10 INTERIOR PAINTING SCHEDULE

A. Concrete Masonry Units:

1. Acrylic-Latex Finish:

- a. Block Filler: High-performance, latex-based, block filler applied at spreading rate recommended by the manufacturer.
 - 1) Sherwin-Williams: PrepRite Block Filler B25W25
 - 2) Glidden Professional: Block Filler (3010)

- 3) Benjamin Moore Super Spec Block Filler 206
 - 4) PPG 6-7 SpeedHide® Int/Ext Masonry Block Filler Latex
 - 5) Coronado SuperKote Block Filler (958-11)
- b. First and Second Coats: Semi-Gloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer.
- 1) Sherwin-Williams: ProMar 200 Latex Semi-Gloss B31W200
 - 2) Glidden Professional: ULTRA-HIDE 150 Latex Semi-Gloss (1416V)
 - 3) Benjamin Moore Ultra Spec 500 S/G N539
 - 4) PPG 6-500 Series SpeedHide® Interior Semi-gloss Acrylic
- c. Surfaces: New masonry walls, where epoxy is not indicated.
2. Epoxy:
- a. Block Filler: Waterborne epoxy polyamide.
- 1) Sherwin-Williams: Epo-Flex WB Epoxy Block Filler
 - 2) Devoe HP Coating: Tru-Glaze WB Epoxy Primer (4015)
 - 3) Benjamin Moore Corotech Waterborne Epoxy Block Filler (V163)
 - 4) PPG 4-603 Perma-Crete® Int/ Ext Alkali Resistant Primer
- b. First and Second Coats: Semi-Gloss, Waterborne epoxy polyamide.
- 1) Sherwin-Williams: Water Base Epoxy B 70/ B60V25 S/G Hardener
 - 2) Devoe HP Coating: Tru-Glaze WB Epoxy (4426)
 - 3) Benjamin Moore Corotech V440 Amine Adduct Epoxy
 - 4) PPG Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551/16-599 Series
- c. Surfaces: New masonry walls where epoxy is indicated.
- B. Gypsum Board:
1. Acrylic-Latex Finish:
- a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer.
- 1) Sherwin-Williams: Vapor Barrier Primer 154-6407
 - 2) Glidden Professional: Vapor Barrier Primer-Sealer (1060)
 - 3) Benjamin Moore Super Spec Vapor Barrier Primer 260
- b. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer.
- 1) Sherwin-Williams: ProMar 200 Latex Semi-Gloss B31W200

- 2) Glidden Professional: ULTRA-HIDE 150 Latex Semi-Gloss (1416v)
 - 3) Benjamin Moore Ultra Spec 500 Semi-Gloss N539
 - 4) Coronado SuperKote 5000 Latex Semi-Gloss (32-1)
- c. Surfaces: Gypsum board walls, bulkheads, ceilings, where epoxy is not indicated.
- d. First and Second Ceiling Coats: Flat, acrylic-latex, applied at spreading rate recommended by the manufacturer
- 1) Sherwin-Williams: Super Save Lite Dryfall Flat B47/B48 Series
 - 2) Glidden Professional: Waterborne Dry Fall Flat (1280)
 - 3) Benjamin Moore SuperKote 5000 Dryfall Flat (N110)
2. Epoxy:
- a. Primer: Waterborne epoxy polyamide.
- 1) Sherwin-Williams: Vapor Barrier Primer 154-6407
 - 2) Glidden Professional: HYDROSEALER Primer Sealer Primer (6001)
 - 3) Benjamin Moore Fresh Start Superior 046
 - 4) Insl-x Aqualock Primer
- b. First and Second Coats: Semi-Gloss, Waterborne epoxy polyamide.
- 1) Sherwin-Williams: Water Base Epoxy B70 Series, Semi-Gloss Hardener B60V25
 - 2) Devoe HP Coating: TRU-GLAZE-WB Epoxy (4426)
 - 3) Benjamin Moore Corotech Acrylic Epoxy V450
- c. Surfaces: Gypsum board walls, bulkheads, ceilings where epoxy is indicated.
- C. Painted Wood:
1. Acrylic-Latex Finish:
- a. First and Second Finish Coats: Semigloss, acrylic-latex interior enamel applied at spreading rate recommended by the manufacturer.
- 1) Sherwin-Williams: ProMar 200 Interior Latex Semi-Gloss
 - 2) Glidden Professional: ULTRA-HIDE 150 Interior Latex Semi-Gloss (1416)
 - 3) Benjamin Moore Ultra Spec 500 Semi-Gloss N539
 - 4) PPG 6-500 Series SpeedHide® Interior Semi-gloss Acrylic
 - 5) Coronado SuperKote 5000 Latex Semi-Gloss
- b. Surfaces: Factory primed standing and running trim.

D. Electrical Equipment Backer Boards:

1. Fire Retardant Coating:

- a. Sherwin-Williams: Flame Control No. 20-20 flat Intumescent Fire Retardant Paint
- b. Devoe HP Coating: Flame Control No. 20-20 flat Intumescent Fire Retardant Paint
- c. Duron: Flame Control No. 20-20 flat Intumescent Fire Retardant Paint
- d. Insl-x LFR110 Flat Intumescent Fire Retardant Paint

E. Ferrous Metal:

1. High-Build Acrylic Polyurethane Enamel:

- a. Primer: Metal primer applied at spreading rate recommended by the manufacturer.
 - 1) Tnemec: Tneme-Fascure Series 161
 - 2) S/W: Recoatable Epoxy Primer (B67 Series)
 - 3) Devoe HP Coating: Devran 205 Universal Epoxy Primer
 - 4) Insl-x Corotech V150 Epoxy Primer
- b. Second Coat:
 - 1) Tnemec: Series 66 Hi-Build Expoxoline
 - 2) S/W: TileClad HS (B62Z Series)
 - 3) Devoe HP Coating: Bar Rust 231 Multi-Purpose Epoxy Mastic
 - 4) Insl-x Corotech V160 Epoxy Mastic
- c. Third Coat: Semigloss, acrylic polyurethane enamel applied at spreading rate recommended by the manufacturer.
 - 1) Tnemec: Series 1075 Endura-Shield
 - 2) S/W: Acrolon 218 HS with SG Hardener (B65 Series)
 - 3) Devoe HP Coating: Devthane 378 Aliphatic Urethane Semi-Gloss Enamel
 - 4) Insl-x Corotech V510 S/G Aliphatic Urethane
- d. Surfaces: Steel surfaces exposed to view (except HM Doors and Frames, see exterior schedule).

END OF SECTION 099000

SECTION 101420 - SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Panel signs.
 - 2. Pin-mounted dimensional characters.
 - 3. Plaques.
 - 4. Field-applied, glass mounted graphic film.
- B. Related Requirements:
 - 1. Refer to Drawings for sign types and locations.
 - 2. Section 015000 "Temporary Facilities and Controls" for temporary Project identification signs and for temporary informational and directional signs.
 - 3. Section 220553 "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
 - 4. Section 230553 "Identification for HVAC Piping and Equipment" for labels, tags, and nameplates for HVAC systems and equipment.
 - 5. Section 260553 "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.
 - 6. Section 265213 "Emergency and Exit Lighting" for illuminated, self-luminous, and photoluminescent exit sign units.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard and to meet requirements of Authorities Having Jurisdiction.
- B. Braille: Grade II Braille. Tactile is required whenever Braille is required.
- C. Tactile: 1/32" raised capital letters without serifs at least 5/8" height and not more than 2" height based on upper case "X." Braille is required whenever tactile is required.

1.4 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For adhesives, indicating VOC content.
 - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings:
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign of size similar to that of the project.
- D. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- E. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Panel Signs: Full-size Sample.
 - 2. Field-Applied, Vinyl-Character Signs: Full-size Sample of characters on glass.
 - 3. Variable Component Materials: Full-size Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.
 - 4. Exposed Accessories: Full-size Sample of each accessory type.
- F. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, materials, and colors.
 - a. When room numbers or names to appear on signs differ from those on the Drawings, include the drawing room number and name on schedule along with the room number and name that will appear on the sign.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Evaluation Reports: For post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

- C. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices and electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled in name groups.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.
- B. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

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- C. Accessibility Standard: Comply with applicable provisions in the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

2.2 PANEL SIGNS

- A. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Basis of Design: Subject to project requirements, Basis of Design is Access Interior Sign System, AG Systems, 302 Commerce Drive, Eaton, PA 19341, phone 610.363.8150.
 - 2. Solid-Sheet Sign: Aluminum or manufacturer's standard sheet with finish specified in "Surface Finish and Applied Graphics" Subparagraph and as follows:
 - a. Thickness: Manufacturer's standard for size of sign.
 - b. Surface-Applied, Flat Graphics: As indicated in Drawings, manufacturer's applied vinyl film or baked enamel or powder coat as suitable for application.
 - c. Surface-Applied, Raised Graphics: Applied polymer characters and Braille.
 - 3. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: As indicated on Drawings.
 - b. Corner Condition in Elevation: As indicated on Drawings.
 - 4. Mounting: As indicated on Drawings and Manufacturer's standard method for substrates indicated with Manufacturer's concealed anchors suitable for application.
 - 5. Surface Finish and Applied Graphics:
 - a. Integral Metal Finish: As selected by Architect from full range of industry finishes.
 - b. Integral Aluminum Finish: Anodized color as selected by Architect from full range of industry colors and color densities.
 - c. Integral Acrylic Sheet Color: As selected by Architect from full range of industry colors.
 - d. Baked-Enamel or Powder-Coat Finish and Graphics: Manufacturer's standard, in color as indicated on Drawings.
 - 6. Text and Typeface: As indicated on Drawings with variable content as scheduled. Finish raised characters to contrast with background color, and finish Braille to match background color.
 - 7. Flatness Tolerance: Sign shall remain flat or uniformly curved under installed conditions as indicated on Drawings and within a tolerance of plus or minus measured diagonally from corner to corner.

2.3 PANEL-SIGN MATERIALS

- A. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Acrylic Sheet: ASTM D4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

- D. Polycarbonate Sheet: ASTM C1349, Appendix X1, Type II (coated, mar-resistant, UV-stabilized polycarbonate), with coating on both sides.
- E. PVC Sheet: Manufacturer's standard, UV-light stable, PVC plastic.
- F. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated on Drawings and suitable for exterior applications.
- G. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following unless otherwise indicated:
 - 1. Use concealed fasteners and anchors unless indicated to be exposed.
 - 2. For exterior exposure, furnish nonferrous-metal, stainless-steel, or hot-dip galvanized Insert requirement devices unless otherwise indicated.
 - 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - 4. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly unless otherwise indicated.
 - b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
 - c. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, and installed in predrilled holes.
 - 5. Inserts: Furnish inserts to be set by other installers into concrete or masonry work.
- B. Adhesive: As recommended by sign manufacturer.
 - 1. Adhesives shall have a VOC content of 70 g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.
- D. Hook-and-Loop Tape: Manufacturer's standard two-part tape consisting of hooked part on sign back and looped side on mounting surface.
- E. Magnetic Tape: Manufacturer's standard magnetic tape with adhesive on one side.

- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.5 PIN-MOUNTED DIMENSIONAL CHARACTERS

- A. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
1. Manufacturers: Subject to compliance with project requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. A.R.K. Ramos.
 - b. Gemini Incorporated.
 - c. Matthews International Corporation; Bronze Division.
 - d. Metal Arts: Div. of L&H Mfg. Co.
 - e. Nelson-Harkins Industries.
 2. Character Material: Cast aluminum, ASTM B26/B26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.
 3. Character Height: As indicated on Drawings.
 4. Character Font: As indicated on Drawings.
 5. Finish and Color: As indicated on Drawings.
 - a. Integral Metal Finish: As selected by Architect from full range of industry finishes.
 - b. Integral Aluminum Finish: Anodized color as selected by Architect from full range of industry colors and color densities.
 - c. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color as selected by Architect from manufacturer's full range.
 6. Mounting: Typical: Concealed studs, projecting 1-inch from wall with aluminum tube spacers.

2.6 PLAQUES

- A. Manufacturers: Subject to compliance with project requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. A.R.K. Ramos.
 - b. Gemini Incorporated.
 - c. Matthews International Corporation; Bronze Division.
 - d. Metal Arts: Div. of L&H Mfg. Co.
 - e. Nelson-Harkins Industries.
- B. Cast Plaque: Provide castings free of pits, scale, sand holes, and other defects and as follows:
- a. Plaque Material: Bronze.
 - b. Location and Message: To be determined by Owner and Architect.
 - c. Size and Thickness: To be selected by Architect.
 - d. Color, Finish, Texture, and Font: To be selected by Architect.
 - e. Mounting: Concealed studs, non-corroding for substrates encountered.

2.7 FIELD-APPLIED, GLASS MOUNTED GRAPHIC FILM

- A. Application: No smoking signs at entrance doors.
- B. Basis of Design: Allstate Sign & Plaque, sticker: 70 Burt Drive, Deer Park, NY 11729, phone 631.242.2828; www.allstatesign.com.
- C. Mounting: Reverse-applied to interior side of glass doors where indicated on plans.
 - a. Manufacturer's recommended adhesive bond for application.
- D. Material: Manufacturer's premium grade indoor/outdoor vinyl.

2.8 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 - 1. Preassemble signs in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 - 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 - 5. Internally brace signs for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
 - 6. Provide rabbets, lugs, and tabs 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. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.
- C. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:
 - 1. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert. Subsequent changeable inserts are by Owner.
- D. Brackets: Where applicable to project, fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
 - 1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match sign-background color unless otherwise indicated.

2.9 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.10 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.
- B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.11 METALLIC-COATED STEEL FINISHES

- A. Surface Preparation: Clean surfaces of oil and other contaminants. Use cleaning methods that do not leave residue. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint, complying with SSPC-Paint 20, to comply with ASTM A780/A780M.
- B. Factory Prime Finish: After cleaning and pretreating, apply an air-dried primer compatible with the organic coating to be applied over it.
- C. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchorage devices embedded in permanent construction are correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Accessible Signage: Install in locations on walls as indicated on Drawings and according to the accessibility standard.
- C. Mounting Methods: Use Manufacturer's recommended mounting method for application.
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 - 2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
 - 3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
 - 4. Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.

5. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
 6. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
- D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101423

SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-plastic toilet compartments and screens, floor mounted and overhead braced, located and configured as indicated in Drawings.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for supports that attach to overhead structural system.
 - 2. Section 061053 "Miscellaneous Rough Carpentry" for blocking.
 - 3. Section 102800 "Toilet, Bath and Custodial Accessories" for accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

- A. Product Data:
 - 1. Solid-plastic toilet compartments.
- B. Shop Drawings: For solid-plastic toilet compartments and screens.
 - 1. Include plans, elevations, sections, details, and attachment details.
- C. Samples: For each type of toilet compartment material indicated.
 - 1. Include Samples of hardware and accessories involving material and color selection.
- D. Sustainable Design Submittals:
 - 1. Environmental Product Declaration (EPD): For each product.

1.4 INFORMATIONAL SUBMITTALS

- A. Certificates:
 - 1. Product Certificates: For each type of toilet compartment by manufacturer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire Performance: Tested in accordance with, and pass the acceptance criteria of, NFPA 286.
- B. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Regional Materials: Products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- D. Regulatory Requirements: Comply with applicable provisions in the U.S. Department of Justice "2010 ADA Standards for Accessible Design" and those of Authorities Having Jurisdiction for toilet compartments designated as accessible.

2.2 SOLID-PLASTIC TOILET COMPARTMENTS

- A. Toilet-Enclosure Style: Floor mounted, overhead braced.
- B. Entrance-Screen Style: Floor mounted, overhead braced.
- C. Urinal-Screen Style: Overhead braced.
- D. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 2. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum or stainless steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
 3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.
- E. Pilaster: Manufacturer's standard design; polymer.
1. Polymer Color and Pattern: To be selected by Architect from manufacturer's full range.
- F. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe and sleeve (cap) matching that on the pilaster.
- G. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; polymer, extruded aluminum, or stainless steel to be selected by Architect.
 - a. Polymer Color and Pattern: Matching panel.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories, Heavy Duty: Manufacturer's heavy-duty operating hardware and accessories.
 1. Hinges: Manufacturer's minimum 0.062-inch- thick stainless steel continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door. Mount with through bolts.
 2. Latch and Keeper: Manufacturer's heavy-duty, surface-mounted, cast-stainless steel latch unit, designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through bolts.
 3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless steel hook and rubber-tipped bumper, sized to prevent inswinging door from hitting compartment-mounted accessories. Mount with through bolts.
 4. Door Bumper: Manufacturer's heavy-duty, rubber-tipped, cast-stainless steel bumper at outswinging doors. Mount with through bolts.
 5. Door Pull: Manufacturer's heavy-duty, cast-stainless steel pull at outswinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through bolts.

2.4 MATERIALS

- A. Aluminum Castings: ASTM B26/B26M.
- B. Aluminum Extrusions: ASTM B221.
- C. Brass Castings: ASTM B584.
- D. Brass Extrusions: ASTM B455.
- E. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- F. Stainless Steel Castings: ASTM A743/A743M.
- G. Zamac: ASTM B86, commercial zinc-alloy die castings.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
- D. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.
- E. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, inswinging doors for standard toilet compartments and 36-inch- wide, outswinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION OF PLASTIC TOILET COMPARTMENTS

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners, so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels and adjust, so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust, so doors are level and aligned with panels, when doors are in closed position.

- D. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on inswinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on outswinging doors to return doors to fully closed position.

END OF SECTION 102113.19

SECTION 102236 - OPERABLE PANEL PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Manually operated, acoustical panel partitions.
 - 2. Manually operated, fire-rated panel partitions.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for supports that attach supporting tracks to overhead structural system.
 - 2. Section 092910 "Gypsum Board Assemblies" for fire-rated assemblies and sound barrier construction above the ceiling at track.
 - 3. Division 26 for emergency and exit lighting requirements.

1.3 DEFINITIONS

- A. STC: Sound Transmission Class.

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. Sustainable Design Submittals:
 - 1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
 - 2. Chain-of-Custody Qualification Data: For manufacturer and vendor.
- C. Shop Drawings: For each operable panel partition indicated in Drawings.
 - 1. Include plans, elevations, sections, attachment details, accessories, and numbered panel installation sequence.

2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.
 3. Setting Drawings: Show imbedded items and cutouts required in other work, including support beam punching template.
- D. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing.
1. Include Samples of accessories involving color and finish selection.
- E. Samples for Verification: For each type of exposed material, finish, covering, or facing, prepared on Samples of size indicated below:
1. Textile Facing Material: Full width by not less than 36-inch- long section of fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat.
 2. Panel Facing Material: Manufacturer's standard-size unit, not less than 3 inches square.
 3. Panel Edge Material: Not less than 3 inches long.
 4. Hardware: One of each exposed door-operating device.

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Partition track, track supports and bracing, switches, turning space, and storage layout.
 2. Suspended ceiling components.
 3. Structural members to which suspension systems will be attached.
 4. Size and location of initial access modules for acoustical tile.
 5. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. HVAC ductwork, outlets, and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Smoke detectors.
 - f. Access panels.
 6. Plenum fire and acoustical barriers.
- B. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template.
- C. Qualification Data: For Installer. An experienced installer who is certified in writing by the operable partition manufacturer as qualified to install the manufacturer's partition systems for work similar in material, design, and extent indicated for this Project.

- D. Seismic Qualification Certificates: Where applicable, for operable panel partitions, tracks, accessories, and components, from manufacturer. Include seismic capacity of partition assemblies to remain in vertical position during a seismic event and the following:
 - 1. Basis for Certification: Indicate whether certification is based on analysis, testing, or experience data, according to ASCE/SEI 7.
 - 2. Detailed description of partition anchorage devices on which the certification is based and their installation requirements.
- E. Product Certificates: For each type of operable panel partition, including flammability certification to meet requirements of Authorities Having Jurisdiction.
- F. Product Test Reports: For each operable panel partition, for tests performed by a qualified testing agency.
- G. Field quality-control reports.
- H. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For operable panel partitions to include in maintenance manuals.
 - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Panel finish facings and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
 - b. Seals, hardware, track, track switches, carriers, and other operating components.
 - c. Electric operator and controls.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same production run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

1.9 QUALITY ASSURANCE

- A. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels. Protect panels during delivery, storage, and handling to comply with manufacturer's written instructions and as required to prevent damage.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Faulty operation of operable panel partitions.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Operable panel partitions shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the partition panels will remain in place without separation of any parts when subjected to the seismic forces specified."
- B. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
 - 1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E90, determined by ASTM E413, and rated for not less than the STC indicated.
- C. Fire-Test-Response Characteristics: Provide panels with finishes complying with one of the following as determined by testing identical products by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Complying with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.
 - 3. Textile interior finish materials shall be Class A in accordance with NFPA 101, 10.2.4.1. Flammability certification shall be available for the partitions (NFPA 101, 12.3.3.)

- D. Fire Resistance: Provide fire-rated operable panel partition assemblies including pass doors complying with NFPA 80, based on testing according to UL 10B for fire-rated door assemblies.
 - 1. Pass doors in fire-rated operable panel partition assemblies shall meet positive-pressure requirements.

2.2 OPERABLE ACOUSTICAL PANELS

- A. Operable Acoustical Panels: Partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
 - 1. Basis of Design Manufacturer and Products: Subject to compliance with requirements, provide products by the following:
 - a. Modernfold, Inc., Acousti-Seal #931 manually operated individual panel operable partition and Acousti-Seal #932 manually operated paired panel operable partition. Where indicated, fire-rated paired panel operable partition Basis of Design product is Acousti-Seal #912.
 - 2. Subject to meeting project requirements, additional manufacturers that may be considered are:
 - a. Hufcor, Inc.
 - b. Advanced Equipment Corporation.
 - c. Panelfold Inc.
- B. Panel Operation: Manually operated, individual and manually operated, paired panels where indicated on Drawings.
- C. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
- D. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
 - 1. Panel Width: Standard widths.
- E. STC: Not less than 50.
- F. Panel Weight: 8 lb/sq. ft. maximum.
- G. Panel Thickness: Nominal dimension of 3 inches.
- H. Panel Materials:
 - 1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
 - 2. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

3. Steel Frame: Steel sheet, manufacturer's standard nominal minimum thickness for uncoated steel.
4. Steel Face/Liner Sheets: Tension-levleed steel sheet, manufacturer's standard minimum nominal thickness for uncoated steel.
5. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; ASTM B221 for extrusions; manufacturer's standard strengths and thicknesses for type of use.
 - a. Frame Reinforcement: Manufacturer's standard steel or aluminum.
6. Gypsum Board: ASTM C1396/C1396M.
7. Cement Board: ASTM C1288.
8. Particleboard: ANSI A208.1.
9. Medium-Density Fiberboard: ANSI A208.2.
10. Plywood: DOC PS 1.

- I. Panel Closure: Manufacturer's standard unless otherwise indicated.
- J. Panel Trim: Panel joints should have minimal groove visual appearance. No vertical trim permitted on edges of panels.
- K. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish as selected by Architect from Manufacturer's standards.
 1. Hinges: Manufacturer's standard full leaf butt hinges, attached directly to the panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame.
 2. Hinges mounted into panel edge or vertical astragal are not acceptable.
- L. Finish Facing: Fabric wall covering as selected by Architect.

2.3 OPERABLE FIRE-RATED PANELS

- A. Operable Fire-Rated Panels: Fire-rated, acoustical panel partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
 1. Basis of Design Manufacturer and Products: Subject to compliance with requirements, provide products by the following:
 - a. Where indicated, fire-rated paired panel operable partition Basis of Design product is Acousti-Seal #912 manufactured by Modernfold, Inc.
 2. Subject to meeting project requirements, additional manufacturers that may be considered are:
 - a. Hufcor, Inc.
 - b. Advanced Equipment Corporation.
 - c. Panelfold Inc.
- B. Panel Operation: Manually operated, paired panels.
- C. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with

tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.

- D. Dimensions: Fabricate operable fire-rated panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
 - 1. Panel Width: Standard widths.
- E. Fire Rating: 1 hour(s).
- F. STC: Not less than 50.
- G. Panel Weight: 8 lb/sq. ft. maximum.
- H. Panel Thickness: Nominal dimension of 3 inches.
- I. Panel Materials:
 - 1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
 - 2. Steel Frame: Steel sheet, manufacturer's standard nominal minimum thickness for uncoated steel.
 - 3. Steel Face/Liner Sheets: Tension-leveled steel sheet, manufacturer's standard minimum nominal thickness for uncoated steel.
- J. Panel Closure: Manufacturer's standard fire-rated closure unless otherwise indicated.
- K. Hardware: Manufacturer's standard as required to operate fire-rated operable panel partition and accessories; with decorative, protective finish as selected by Architect from Manufacturer's standards.
 - 1. Hinges: Manufacturer's standard full leaf butt hinges, attached directly to the panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame.
 - 2. Hinges mounted into panel edge or vertical astragal are not acceptable.
 - 3. Finish Facing: Fabric wall covering as selected by Architect.

2.4 SEALS

- A. Description: Seals that produce operable panel partitions complying with performance requirements and the following:
 - 1. Manufacturer's standard seals unless otherwise indicated.
 - 2. Seals made from materials and in profiles that minimize sound leakage.
 - 3. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.
- B. Vertical Seals: Manufacturer's deep-nesting, interlocking steel astragals mounted on each edge of panel, with continuous, resilient acoustical seal. Rigid plastic or aluminum astragals or astragals in only one panel edge are not acceptable.

- C. Horizontal Top Seals: Manufacturer's standard continuous-contact, resilient seal exerting uniform constant pressure on track.
- D. Horizontal Bottom Seals: Manufacturer's standard continuous-contact seal exerting uniform constant pressure on floor.
- E. Horizontal Bottom Seals: Resilient, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.
 - 1. Automatically Operated for Acoustical Panels: Extension and retraction of bottom seal automatically operated by movement of partition, providing nominal 2-inch clearance with an operating range of + 1/2-inch to - 1-1/2-inch, which automatically drop as panels are positioned, without the need for tools or cranks.

2.5 PANEL FINISH FACINGS

- A. Description: Finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.
 - 1. Apply one-piece, seamless facings free of air bubbles, wrinkles, blisters, and other defects, with edges tightly butted, and with no gaps or overlaps. Horizontal butted, edges, or seams are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
 - 2. Where facings with directional or repeating patterns or directional weave are indicated, mark facing top and attach facing in same direction.
 - 3. Match facing pattern 72 inches above finished floor.
- B. Fabric Wall Covering: As selected by Architect, meeting project requirements and, from same dye lot, treated to resist stains and required fire resistance ratings.
 - 1. Color/Pattern: As selected by Architect.
- C. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.

2.6 SUSPENSION SYSTEMS

- A. Tracks: Manufacturer's standard steel mounted directly to overhead structural support, with adjustable steel hanger rods for overhead support, designed for operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

1. Panel Guide: Manufacturer's standard steel guide on both sides of the track to facilitate straightening of the panels; finished with factory-applied, decorative, protective finish as selected by Architect.
 2. Head Closure Trim: As required for acoustical performance; with finish as selected by Architect for application.
- B. Carriers: Steel trolley system as required for configuration type, size, and weight of partition and for easy operation; with steel tired ball-bearing wheels.
1. Single panel suspension system shall provide automatic indexing of panels into stack area using preprogrammed switches and trolleys without electrical, pneumatic, or mechanical activation.
 2. Multidirectional Carriers: Capable of negotiating intersections without track switches.
- C. Track Intersections, Switches, and Accessories: As required for operation, storage, track configuration, and layout indicated for operable panel partitions, and compatible with partition assembly specified. Fabricate track intersections and switches from steel.
1. Exposed Track Soffit: Steel, removable
- D. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

2.7 ACCESSORIES

- A. Pass Doors: Swinging door built into and matching panel materials, construction, acoustical qualities, fire rating, finish and thickness, trimless, complete with frames and operating hardware. Hinges finished to match other exposed hardware. No threshold permitted.
1. Accessibility Standard: Fabricate doors to comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design," the ABA standards of the Federal agency having jurisdiction and ICC A117.1.
 2. Pass-Door: Matching thickness and appearance of the panels, in locations indicated on Drawings.
 3. Pass-Door Hardware: Equip pass door with the following:
 - a. Door Seals: Manufacturer's standard for application.
 - b. Panic or Fire exit hardware where indicated.
 - c. Concealed door closer.
 - d. Exit Sign: Recessed, self-illuminated.
 - e. Latchset: Passage set.
 - f. Lock: Deadlock to receive cylinder, operable from both sides of door. See Section 087100 "Door Hardware" for lock cylinder and keying requirements.
- B. Storage Pocket Door: Full height at end of partition runs to conceal stacked partition; of same materials, finish, construction, thickness, and acoustical qualities as panels; complete with operating hardware and acoustical seals at soffit, floor, and jambs. Hinges in finish to match other exposed hardware.
1. Manufacturer's standard method to secure storage pocket door in closed position.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine flooring, floor levelness, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.
- B. Install panels in numbered sequence indicated on Shop Drawings.
- C. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.
- D. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

3.3 CLEANING AND PROTECTION

- A. Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer that insure operable partitions are without damage or deterioration at time of Substantial Completion.

3.4 ADJUSTING

- A. Adjust operable panel partitions, hardware, and other moving parts to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, or malfunction, throughout entire operational range. Lubricate as recommended by manufacturer.
- B. Adjust pass doors and storage pocket doors to operate smoothly and easily, without binding or warping.
- C. Verify that safety devices are properly functioning.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.

END OF SECTION 102236

SECTION 102600 - WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Corner guards.
 - 2. Abuse-resistant wall coverings.
- B. Related Requirements:
 - 1. Refer to Section 111313 "Loading Dock Protection" and Drawings for exterior protection at loading dock.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
- B. Sustainable Design Submittals:
 - 1. Product Data: For adhesives, indicating VOC content.
 - 2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For each type of wall and door protection showing locations and extent.
 - 1. Include plans, elevations, sections, and attachment details.
- D. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.
- E. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:
 - 1. Corner Guards: 12 inches long. Include example top caps.
 - 2. Abuse-Resistant Wall Covering: 6 by 6 inches square.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type of exposed plastic material.

- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of wall protection product to include in maintenance manuals.
 - 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.6 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. Corner-Guard Covers: Full-size plastic covers of maximum length equal to [2] Insert number percent of each type, color, and texture of cover installed, but no fewer than two, 48-inch- long units.
 - 2. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
 - 2. Keep plastic materials out of direct sunlight.
 - 3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
 - a. Store corner-guard covers in a vertical position.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall-protection products of each type from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.

2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1.

2.3 CORNER GUARDS

A. Surface-Mounted, Plastic-Cover Corner Guards: Manufacturer's standard, PVC-free assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.

1. 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. Construction Specialties, Inc.
- b. JL Industries, Inc.; a division of the Activar Construction Products Group.
- c. Nystrom, Inc.
- d. WallGuard.com.

2. Cover: Extruded rigid plastic, minimum 0.100-inch wall thickness;

- a. Profile: Nominal 2-inch- long leg and 1/4-inch corner radius.
- b. Height: 4 feet.
- c. Color and Texture: As selected by Architect from manufacturer's full range.

3. Continuous Retainer: One-piece extruded plastic.

4. Retainer Clips: Manufacturer's standard impact-absorbing clips.

5. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

B. Fire-Rated, Flush-Mounted, Plastic-Cover Corner Guards: Manufacturer's standard, PVC-free assembly consisting of snap-on, resilient plastic cover that is flush with adjacent wall surface, installed over continuous retainer and intumescent fire barrier; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition; full wall height.

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. Construction Specialties, Inc.
- b. JL Industries, Inc.; a division of the Activar Construction Products Group.
- c. Nystrom, Inc.
- d. WallGuard.com.

2. Fire Rating: Same rating as wall in which corner guard is installed; UL listed and labeled according to ASTM E1966 or UL 2079.

3. Cover: Extruded rigid plastic, minimum 0.100-inch wall thickness;

- a. Leg: Nominal 2 inches.
- b. Corner Radius: 1/4 inch.
- c. Color and Texture: As selected by Architect from manufacturer's full range.

4. Retainer: Minimum 0.070-inch- thick, one-piece, extruded aluminum.

C. Surface-Mounted, Metal Corner Guards: Fabricated as one piece from formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.

1. Material: Stainless-steel sheet, Type 304.
 - a. Thickness: Minimum 0.0500 inch.
 - b. Finish: Directional satin, No. 4.
2. Wing Size: As indicated.
3. Corner Radius: 1/8 inch.
4. Mounting: Flat-head, countersunk screws through factory-drilled mounting holes.

2.4 ABUSE-RESISTANT WALL COVERINGS

- A. Abuse-Resistant Sheet Wall Covering: Fabricated from semirigid, plastic sheet wall-covering material.
 1. Basis of Design Manufacturer and Product: CS Acrovyn Vinyl Wall Protection 4000 Series.
 2. Size: 48 by 96 inches for sheet.
 3. Sheet Thickness: 0.040 inch.
 4. Color and Texture: Refer to Finish/Color Schedule.
 5. Height: As indicated.
 6. Trim and Joint Moldings: Extruded rigid plastic that matches wall-covering color.
 7. Mounting: Adhesive.

2.5 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Polycarbonate Plastic Sheet: ASTM D6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft.-lbf/in. of notch when tested according to ASTM D256, Test Method A.
- C. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- D. Adhesive: As recommended by protection product manufacturer.
 1. Adhesives shall have a VOC content of 70 g/L or less.
 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.6 FABRICATION

- A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

- B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.7 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of the Work.
- B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
 - 1. For wall and door protection attached with adhesive, 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.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing wall and door protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

- B. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
 - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
 - 2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
 - 3. Adjust end and topcaps as required to ensure tight seams.
- C. Abuse-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

SECTION 102800 - TOILET, BATH, AND CUSTODIAL ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Public-use toilet room accessories.
 - 2. Public-use shower room accessories.
 - 3. Custodial accessories.
- B. Related Requirements:
 - 1. Section 088300 "Mirrors" for frameless mirrors.
 - 2. Section 102113.19 "Plastic Toilet Compartments" for hooks and other accessories provided by plastic toilet compartment manufacturer.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated in Drawings.
 - 2. Identify accessories using designations indicated.
 - 3. Identify accessories that are Owner Furnished, Contractor Installed as indicated in Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.6 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with Accessible Design Requirements and requirements of Authorities Having Jurisdiction.

2.2 OWNER-FURNISHED ACCESSORIES

- A. Owner-Furnished Accessories: As indicated in Documents as Owner Furnished, Contractor Installed (OFICI). Provide all necessary blocking, connections, components for a complete installation.

2.3 PUBLIC-USE TOILET ROOM ACCESSORIES

- A. Toilet Tissue (Roll) Dispenser (TTD):
 - 1. Owner Furnished, Contractor Installed: Impact Clearvu Twin 9" Toilet Tissue Dispenser #2529, manufactured by Impact Products, in locations indicated in Drawings.
 - 2. Description: Smoke-colored plastic, double-roll dispenser with double latch key lock.
 - 3. Mounting: Surface mounted.
- B. Electronic Paper Towel (Roll) Dispenser (PTD):
 - 1. Owner Furnished, Contractor Installed: Elite ("Essity") Electronic Paper Towel Dispenser, manufactured by Pro-Link, phone 800.74.LINKS, www.prolinkhq.com.
 - 2. Description: Automatic motion sensing mechanism with user-adjustable delay and paper towel length; battery powered.
 - 3. Mounting: Surface mounted.
 - 4. Material and Finish: Manufacturer's standard ABS plastic, dark gray.
 - 5. Lockset: Manufacturer's standard.
- C. Automatic Liquid-Soap Dispenser (SD):
 - 1. Owner Furnished, Contractor Installed: Pro-Link 1200 mL Free Hands Touch-free Liquid Soap Dispenser, manufactured by Pro-Link, phone 800.74.LINKS, www.prolinkhq.com.

2. Description: Automatic refillable dispenser with infrared sensor to detect presence of hands; battery powered; designed for dispensing soap in liquid or foam form – type to be selected by Owner.
 3. Location: As indicated in Drawings.
 4. Capacity: 1200 mL.
 5. Materials: Manufacturer's standard materials and finishes. Color to be selected by Owner.
 6. Low Battery Indicator: Manufacturer's standard low battery indicator.
- D. Grab Bar (GB):
1. Basis of Design: Subject to compliance with requirements, provide B-6806 Series Stainless Steel Grab Bars manufactured by Bobrick Washroom Equipment, Inc.
 2. Mounting: Flanges with concealed fasteners and snap flange covers.
 3. Material: Stainless steel, 18-8, Type 304.
 - a. 18-gauge stainless steel tubing for grab bar, 11-gauge for concealed mounting flanges, 22 gauge for snap flange covers.
 4. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin) with slip-resistant texture in grip area.
 5. Outside Diameter: 1-1/2 inches.
 6. Configuration and Length: As indicated on Drawings.
- E. Sanitary-Napkin Disposal Unit (SND):
1. Basis of Design: Subject to compliance with requirements, provide sanitary napkin disposal Model B-270, manufactured by Bobrick Washroom Equipment, Inc.
 2. Mounting: Surface mounted.
 3. Door or Cover: Manufacturer's standard drawn one-piece seamless construction with full length stainless steel piano hinge and integral finger depression for opening cover.
 4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
 5. Location: As indicated in Drawings.
- F. Seat-Cover Dispenser (SCD):
1. Owner Furnished, Contractor Installed: Toilet Seat Cover Dispenser #1120, manufactured by Impact Products, in locations indicated in Drawings.
 2. Mounting: Surface mounted.
 3. Minimum Capacity: 500 seat covers.
 4. Exposed Material and Finish: Manufacturer's standard high impact plastic, color to be selected by Owner.
- G. Mirror Unit (MR):
1. Basis of Design: Subject to compliance with requirements, provide mirror with stainless steel channel frame Model B-165 2436, manufactured by Bobrick Washroom Equipment, Inc.
 2. Frame: Stainless steel channel.
 - a. Corners: Manufacturer's standard, mitered.
 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using manufacturer's standard method for application.
 4. Mirror Glass: No. 1 quality, 1/4 inch select float glass, selected for silvering and guaranteed for 15 years minimum against silver spoilage. Back is protected by full-size, shock-absorbing, water-resistant, nonabrasive, polyethylene padding.

5. Size: 24 inches x 36 inches in locations indicated in the Drawings.

2.4 PUBLIC-USE SHOWER ROOM ACCESSORIES

- A. Shower Curtain Rod (SCR): In location and dimension indicated in Drawings.
 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. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 2. Description: 1-inch OD; fabricated from nominal 0.0375-inch- thick stainless steel.
 3. Mounting Flanges: Stainless steel flanges designed for concealed fasteners.
 4. Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- B. Robe Hook (RH): In location indicated in Drawings.
 1. Note: Hooks that are provided with the plastic toilet partition system are separate and indicated in Section 102113.19 "Plastic Toilet Compartments."
 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. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 3. Description: Double-prong unit.
 4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin) unless indicated otherwise.

2.5 CHILDCARE ACCESSORIES

- A. Diaper-Changing Station (BCS): In locations indicated in Drawings.
 1. Basis of Design: KB200 Horizontal Wall Mounted baby changing station, manufactured by Koala Kare Products. Color to be selected by Architect.
 2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
 - a. Engineered to support minimum of 200-lb static load when opened.
 3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
 4. Operation: Manufacturer's standard shock-absorbing mechanism.
 5. Material and Finish: Manufacturer's standard steel chassis with polypropylene in manufacturer's standard color with antimicrobial agent incorporated, with rounded corners.
 6. Liner Dispenser: Built in.
 7. Child Protection Straps: Built in.

2.6 CUSTODIAL ACCESSORIES

- A. Combination Utility Shelf /Mop and Broom Holder (US/MBH):
1. General: Combination Utility Shelf/Mop and Broom Holder in location indicated in Drawings.
 2. Description: With exposed edges turned down not less than 1/2 inch and supported by two triangular brackets welded to shelf underside.
 3. Size: Manufacturer's standard size for application.
 4. Material and Finish: Not less than nominal 0.05-inch- thick stainless steel, ASTM A480/A480M No. 4 finish (satin).
 5. Mop and Broom Holders: Three spring-loaded, rubber hat, cam type, mounted at shelf front.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Mounting Heights and Locations: As indicated in Drawings and as required by accessibility regulations and Authorities Having Jurisdiction.
- C. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F446.

END OF SECTION 102800

SECTION 104413 - FIRE PROTECTION CABINETS AND FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for portable fire extinguishers and fire hose, rack, and fire hose valve. Refer to Drawings for locations.
2. Portable fire extinguishers to match existing.

1.2 PREINSTALLATION CONFERENCE

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fire-protection cabinets.
- C. Samples: For each type of exposed finish required.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers and hoses indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths and finish requirements.
- C. Coordinate installation with finished wall surfaces.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed and Authorities Having Jurisdiction.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10 (2013 edition), "Portable Fire Extinguishers."
- C. 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. Match existing facility for type, class, and rating.

2.3 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher or hose, rack, and valve, and matching existing if meeting project requirements. Locate where indicated in Drawings and meeting requirements, including finish requirements.
 - 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. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - b. Larsens Manufacturing Company.
 - c. Potter Roemer LLC; a Division of Morris Group International.
- B. Cabinet Construction: Non-rated or fire-rated, as required for application in locations indicated.
 - 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- thick cold-rolled steel sheet lined with minimum 5/8-inch- thick fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Cold-rolled steel sheet.
- D. Recessed Cabinet:
 - 1. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box, to act as drywall bead. For use in public spaces or where indicated in Drawings.

2. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend). For use in back of house spaces or where indicated in Drawings.
- E. Semirecessed Cabinet: Provide semirecessed cabinet where indicated or where wall thickness is too narrow to accommodate a fully recessed cabinet. One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
 1. Square-Edge Trim: Match existing backbend depth.
- F. Cabinet Trim Material: Manufacturer's standard steel or aluminum sheet same material and finish as door.
- G. Door Material: Manufacturer's standard steel or aluminum sheet, reinforced for flatness and rigidity.
- H. Door Style: As selected by Architect from Manufacturer's standards for application.
- I. Door Glazing: Tempered float glass (clear).
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Manufacturer's standard hinge for 180 degree opening with continuous hinge and roller-type catch.
- K. 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. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.
- L. Materials:
 1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.
 - a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
 - b. Color: As selected by Architect from manufacturer's full range.
 2. Aluminum: ASTM B221 for extruded shapes and aluminum sheet, with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet.
 - a. Finish: Clear anodic.
 - b. Color: As selected by Architect from full range of industry colors and color densities.
 3. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304.
 - a. Finish: ASTM A480/A480M No. 4 directional satin finish,.
 4. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.4 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare recesses for recessed and semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- E. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- F. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 104413

SECTION 111313 - LOADING DOCK PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Loading dock bumpers.
 - 2. Loading dock truck shelter.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of loading dock bumper and dock truck shelter.
- B. Shop Drawings: For dock bumpers and dock truck shelter. Include plans, elevations, sections, and attachment details for a complete installation.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For loading dock truck shelter to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 LOADING DOCK BUMPERS

- A. General: Surface-mounted bumpers; of type, size, and construction indicated; designed to absorb kinetic energy and minimize damage to loading dock structure.
- B. Molded-Rubber Loading Dock Bumpers: Fabricated from molded-rubber compound reinforced with nylon, rayon, or polyester cord; with Shore A durometer hardness of 80, plus or minus 5, when tested according to ASTM D2240.
 - 1. Location: As indicated on Drawings.
 - 2. Configuration: As indicated on Drawings.
 - 3. Thickness: As indicated on Drawings.

- C. Materials: ASTM A36/A36M for steel plates, shapes, and bars. Hot-dip galvanize according to ASTM A123/A123M.

2.2 LOADING DOCK TRUCK SHELTER

- A. General: For loading dock protection and full access to truck trailers while minimizing pressure on building walls.
- B. Basis of Design: Subject to complying with Project requirements, Basis of Design loading dock truck shelter manufacturer and product: NOVA Technology, NOVA Dock Seals & Shelters, NOVA RF Series, Menomonee Falls, WI, phone: 262.502.1591/ 800.236.7325, www.novalocks.com.
- C. Location: As indicated in the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Attach loading dock bumpers to face of loading dock in a manner that complies with requirements indicated for spacing, arrangement, and position relative to top of platform and anchorage.
 - 1. Welded Attachment: Plug-weld anchor holes in contact with steel inserts and fillet weld at other locations.
 - 2. Bolted Attachment: Attach dock bumpers to preset anchor bolts embedded in concrete or to cast-in-place inserts or threaded studs welded to embedded-steel plates or angles. If preset anchor bolts, cast-in-place inserts, or threaded studs welded to embedded-steel plates or angles are not provided, attach dock bumpers by drilling and anchoring with expansion anchors and bolts.
 - 3. Screw Attachment: Attach dock bumpers to wood construction with lag bolts as indicated.
- B. After completing installation of exposed, factory-finished dock bumpers, inspect exposed finishes and repair damaged finishes.
- C. Install loading dock truck shelter per manufacturer's written instructions for application for a complete installation.
- D. After completing installation of loading dock truck shelter, inspect for functional and physical damage to components or finishes and repair damage.

END OF SECTION 111313

SECTION 113100 – APPLIANCES AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Food cooling and warming appliances and equipment.
- B. Related Requirements:
 - 1. Electrical and plumbing drawings and specifications related to appliances and equipment.
 - 2. Drawings for appliance and equipment schedule and locations. Equipment furnished and installed by Owner are indicated on the schedule on the drawings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. ENERGY STAR: Product Data for indicated products, showing compliance with requirements for ENERGY STAR product labeling.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Field quality-control reports.
- C. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Gas-Fueled Appliances: Certified by a qualified testing agency for each type of gas-fueled appliance according to ANSI Z21 Series standards.

2.2 UNDERCOUNTER REFRIGERATOR

- A. Undercounter Refrigerator (EQ1): Built-in undercounter ADA compliant refrigerator.
 - 1. Basis of Design: Subject to complying with project requirements, Basis of Design undercounter refrigerator is model AL54 manufactured by Summit Appliance Division, Felix Storch, Inc., 770 Garrison Avenue, Bronx, New York 10474, Phone: 718.893.3900.
 - 2. Type: Built in, undercounter, 32-inch height.
 - 3. Storage Capacity:
 - a. Refrigeration Compartment Volume: 4.8 cu. ft..
 - 4. General Features:
 - a. Interior light in refrigeration compartment.
 - b. Automatic defrost.
 - c. Factory installed lock.
 - d. Digital thermostat.
 - e. Adjustable glass shelves.
 - f. Door storage.
 - 5. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
 - 6. Front Panel(s): Stainless steel.

2.3 COMMERCIAL BEVERAGE CENTER

- A. Commercial Beverage Center (EQ2): Full-size commercial beverage center. Commercially approved to NSF-7 standards.
 - 1. Basis of Design: Subject to complying with project requirements, Basis of Design full-size commercial beverage center is model SCR1401LH manufactured by Summit Appliance Division, Felix Storch, Inc., 770 Garrison Avenue, Bronx, New York 10474, Phone: 718.893.3900.
 - 2. Type: Freestanding.
 - 3. Storage Capacity:
 - a. Refrigeration Compartment Volume: 12.6 cu. ft..
 - 4. General Features:
 - a. Stainless steel interior.
 - b. Self-closing double-pane glass door.
 - c. Digital thermostat.

- d. Cantilevered adjustable shelving.
- e. Interior recessed LED light in refrigeration compartment.
- f. Automatic defrost.
5. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
6. Front Panel(s): Manufacturer's standard glass and stainless steel.

2.4 REACH-IN REFRIGERATOR

- A. Reach-in Refrigerator (EQ3): Extra-wide reach-in refrigerator.
1. Basis of Design: Subject to complying with project requirements, Basis of Design reach-in refrigerator is model RS-1D-S1-EW manufactured by Victory, 3779 Champion Boulevard, Winston-Salem, NC 27105, Phone 888.845.9800, www.victoryrefrigerator.com.
 2. Type: Freestanding, one-section.
 3. Storage Capacity:
 - a. Refrigeration Compartment Volume: 76.08 cu. ft..
 4. General Features:
 - a. Stainless steel interior.
 - b. Heavy-duty cylinder lock on door(s).
 - c. Self-closing stainless steel door(s) with 120 deg hold-open feature.
 - d. Cam-lift hinges.
 - e. Manufacturer's standard epoxy-coated wire shelves.
 - f. Interior LED light in refrigeration compartment activated by proximity door switch.
 - g. Manufacturer's standard high-efficiency, air-cooled refrigeration system.
 - h. Manufacturer's standard electronic control system.
 5. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
 6. Front Panel(s): Manufacturer's standard stainless steel.

2.5 REACH-IN WARMING CABINET

- A. Reach-in Warming Cabinet (EQ4):
1. Basis of Design: Subject to complying with project requirements, Basis of Design reach-in warming cabinet is model HS-1D-1 manufactured by Victory, 3779 Champion Boulevard, Winston-Salem, NC 27105, phone 888.845.9800, www.victoryrefrigerator.com.
 2. Type: Freestanding, one-section.
 3. Capacity:
 - a. Net capacity: 21.5 cu. ft..
 4. General Features:
 - a. Stainless steel interior door liner.
 - b. Heavy-duty cylinder lock on door(s).
 - c. Self-closing stainless steel door(s) with 120 deg hold-open feature.
 - d. Cam-lift hinges.
 - e. Manufacturer's standard chrome-plated wire shelves.

- f. Interior light activated by proximity door switch.
- g. Manufacturer's standard high-efficiency heating system.
- h. Manufacturer's standard electronic control system.
5. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
6. Front Panel(s): Manufacturer's standard stainless steel.

2.6 ICEMAKERS

- A. Icemaker: Ice Cube Machine with Ice Storage Bin (EQ5):
 1. Basis of Design: Subject to complying with project requirements, Basis of Design ice cube machine with ice storage bin is model iT0429 with D-320 Storage Bin, manufactured by Manitowoc, 2110 South 26th Street, Manitowoc, WI 54220, phone 920.682.0161.
 2. Type: Freestanding, air cooled. Ice Cube maker mounts on top of ice storage bin.
 3. Ice Bin Capacity:
 - a. Storage: 264 lb.
 4. Features:
 - a. Programmable ice production.
 - b. Manufacturer's standard electronic control system with touch screen display.
 5. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
 6. Front Panel: Manufacturer's standard corrosion resistant.

2.7 WORKTABLE

- A. Worktable with Rolled Rim Edge (EQ6):
 1. Basis of Design: Subject to complying with project requirements, Basis of Design stainless steel worktable with rolled rim edge is Blendport FL Series Worktables, model BPT-2448FL, manufactured by Blendport, an Eagle Group Company, 100 Industrial Boulevard, Clayton, Delaware 19938, phone 800.441.8440
 2. Size: 24 inches wide by 48 inches long.
 3. Material: Stainless steel, type 430, 18 gauge.
 4. Style: Stainless steel sound-deadened top with front rolled rim, 1 1/2-inch rear upturn, and square bend on ends.
 - a. Legs: 1 5/8 inch-diameter galvanized steel with adjustable plastic feet.
 - b. Undershef: 18-gauge galvanized steel.

2.8 MICROWAVE OVENS

- A. Microwave Oven (EQ7):
 1. Basis of Design: Subject to complying with project requirements, Basis of Design is GE Profile 2.2 cu.ft. Countertop Sensor Microwave Oven, Model number PES7227SLSS, manufactured by GD Appliances, a Haier Company.
 2. Mounting: Countertop.
 3. Capacity: 2.2 cu. ft..

4. Exhaust Fan: Variable-speed fan with manufacturer's standard capacity.
5. Microwave Power Rating: 1100 W.
6. Power Levels: 10.
7. Controls: Electronic touch digital display
8. Turntable: Glass, 16 inches diameter minimum.
9. Material: Manufacturer's standard.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Provide all components from same manufacturer for a complete installation.
- B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 3. Operational Test: After installation, start units to confirm proper operation.
 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- B. An appliance or equipment will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 113013

SECTION 116103 – THEATRICAL NETWORKED LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes all labor, materials, equipment and services necessary to manufacturer and deliver to job site, for installation by Electrical Contractor, a complete Lighting Control System as shown on the drawings and/or specified herein, including but not limited to the following:
 - 1. Permanent dimmer racks for stage lighting.
 - 2. Ethernet control system equipment rack, Ethernet taps, DMX gateways, and associated equipment.
 - 3. DMX distribution system.
 - 4. Computerized stage lighting control console and associated equipment.
 - 5. House Light control stations.
 - 6. Mains-fed lighting control panelboards (LCP-##) feeding architectural lighting.
 - 7. Lighting control network equipment including:
 - a. Lighting control processors
 - b. Ethernet switches and patch bays with related cabling
 - c. Rack-mount Ethernet-to-DMX gateway nodes for control of stage lighting fixtures and architectural lighting fixtures.
 - d. DMX splitters with related cabling
 - e. Interfaces with other building systems as required, such as building automation, A/V controls, fire alarm control panel, and related input/output interfaces.
 - f. Equipment racks with uninterruptible power supply.
 - 8. Computerized stage lighting control consoles and associated equipment.
 - 9. Architectural lighting control stations (house light stations), including button stations and touchscreen stations.
 - 10. Architectural lighting DMX distribution system including emergency control overrides (emergency lighting transfer specified elsewhere)

1.3 It shall be the responsibility of the Lighting Control System Manufacturer to furnish equipment complete in all respects and to provide any additional equipment required to fulfill the intent of these drawings and specifications whether or not such items are herein specified or indicated.

1.4 MANUFACTURING STANDARDS

A. All work shall be manufactured in accordance with the latest editions of applicable publications and standards of the following organizations:

1. National Electric Code (NEC) and all prevailing local and state regulations including:
 - a. ANSI/NFPA 70: National Electrical Code
2. Entertainment Services and Technology Association (ESTA) including:
 - a. ANSI/ESTA E1.3-2001(R2016): Lighting Control Systems – 0-10V Analog Control Specification
 - b. ANSI/ESTA E1.11-2008 (R2018): USITT DMX512-A
 - c. ANSI/ESTA E1.17-2015: Architecture for Control Networks (ACN)
 - d. ANS/ESTA I E1.20-2010: Remote Device Management over USITT DMX512
 - e. ANSI/ESTA E1.27-1-2006 (R2016): Portable Control Cables for DMX512
 - f. ANSI/ESTA E1.27-2-2009 (R2014): Permanently Installed Control Cables for DMX512
 - g. ANSI/ESTA E1.31-2018: ACN transport of DMX-512
3. Occupational Safety & Health Act (OSHA)

1.5 SUBMITTALS WITH BIDS

- A. Submit with bid a schedule listing the following time estimates:
1. Length of time required to prepare shop drawings.
 2. Length of time required to supply all equipment.

1.6 SUBMITTALS

- A. Lighting Control System Manufacturer shall prepare and submit complete shop drawings according to the requirements set forth in the Contract Documents.
- B. Product Data Sheets
1. For Manufacturer standard panels, enclosures, modules, devices, and other equipment, with options and other variables clearly noted on data sheets.
- C. Shop Drawings
1. Shop drawings shall be reviewed by the Architect before fabrication may begin.
 - a. Such review does not relieve the Lighting Control System Manufacturer of the responsibility of providing equipment in accordance with this Specification.
 2. Shop drawings shall show optical or transformer isolation of all control data lines between relay panels and architectural lighting processor.
 3. Shop drawings shall show materials, finishes, metal gauges, overall and detail dimensions, sizes, electrical and mechanical connections, fasteners, welds, provisions for the work of others, and similar information.

4. Shop drawings shall indicate complete details of equipment, including manufacturer's catalog numbers for components, and shall include complete wiring diagrams.
 5. Any deviation from this Specification shall be "starred" and noted in letters a minimum 1/4" high.
 - a. For a deviation to be considered, it shall upgrade the quality of the equipment or respond to a field condition.
 6. The reviewed shop drawings shall be updated to show any changes made during manufacturing and assembly and shall be provided to the Architect before the equipment is delivered.
- D. Lighting Control System Manufacturer shall provide installation instructions for all equipment. These instructions shall include connection diagrams, termination designations, etc.
- E. Coordination Drawings:
1. Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections.
 - a. Show interconnecting signal and control wiring and interfacing devices that prove compatibility of inputs and outputs.
 - b. For networked controls, list network protocols and provide statements from manufacturers that input and output devices meet interoperability requirements of the network protocol.
- F. After the installation is complete, the Lighting Control System Manufacturer shall provide the Owner with Operations and Maintenance Manuals not more than 14 days after the checkout is completed.
1. One O&M manual shall be a printed hard copy and O&M manual shall also be provided in electronic format on two flash drives.
 2. Each O&M manual shall include, but not be limited to, the following:
 - a. Copies of all record shop drawings.
 - b. Catalog cuts of all equipment provided.
 - c. Recommendations for periodic maintenance.
 - d. Catalog numbers and manufacturers' names and addresses for perishable items such as pilot lamps and fuses.
 - e. Diagnostic procedures.
 - f. Internet address for online access to manuals, product literature, and troubleshooting guides.
 - g. Emergency and normal repair telephone contact sheet for 7-day, 24-hour service.
 3. Lighting Control System Manufacturer shall provide the Owner with three instruction manuals for each control console type.
 - a. Instruction manual shall be supplied to the Owner's Representative on the day of the Lighting Control System checkout.
 - b. Instruction manuals may be requested by the Owner's Representative at a date prior to the system checkout.

1.7 SYSTEM INTEGRATOR

- A. System Integrator shall be responsible for scope outlined in this Specification and for the following related Specification sections:
 - 1. 116106 – Stage Wiring Devices
 - 2. 116109 – Stage Lighting Fixtures and Accessories
- B. System Integrator must have minimum five years' experience with supply, installation, commissioning, and integration of theatrical and architectural lighting control systems. System Integrator must have at least 10 recent projects of similar scope and characteristics to those specified herein.
- C. System integrator shall be responsible for furnishing factory authorized personnel for system startup, programming, commissioning, and Owner training.
 - 1. Approved Integrators for the Work of this Section include:
 - a. Barbizon Chicago – Chicago, IL - 773-276-8500
 - b. Clearwing Productions – Milwaukee, WI - 414-258-6333
 - c. Gopher Stage Lighting – Minneapolis, MN - 877-871-0138
 - d. Integrated Theatre Systems – Pittsburgh, PA - 412-441-8000
 - e. Live Technologies – Columbus, OH - 614-278-7777
 - f. Mainstage Theatrical Supply – Milwaukee, WI - 888-936-7687
 - g. Scenic Solutions – West Carrollton, OH – 888-866-5062
 - h. Texas Scenic – New York, NY - 718-402-2677
 - i. Vincent Lighting Systems – Cleveland, OH - 800-922-5356

1.8 PROJECT CONDITIONS

- A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
 - 1. Ambient temperature: 0 degrees to 40 degrees C (32 degrees to 104 degrees F).
 - 2. Relative humidity: Maximum 90 percent, non-condensing.
 - 3. Lighting Control System must be protected from dust during installation.

1.9 COORDINATION

- A. Coordinate lighting control components to form an integrated interconnection of compatible components.
 - 1. Match components and interconnections for optimum performance of lighting control functions.
 - 2. Coordinate lighting controls with BAS if applicable. Design display graphics showing building areas controlled; include the status of lighting controls in each area.

3. Coordinate lighting controls with that in Sections specifying distribution components that are monitored or controlled by power monitoring and control equipment.
- B. Coordinate lighting control loads specified in this Section with components providing overcurrent protection as specified in Division 26 Section "Panelboards."

1.10 LABELING

- A. Ethernet Taps and DMX devices shall have Control Device Number (i.e. 'ET-5') clearly indicated with minimum 1/4" tall white characters on black faceplate. Label shall be centered above control port(s).
 1. All faceplate labels shall be as shown on the QT-series Drawings and verified in Shop Drawings.
- B. Furnish and install removable adhesive labels for each Theatrical Control Device back box and rear of faceplate, indicating the Control Device Number (i.e. 'ET-5') and serial code to facilitate programming and commissioning.

1.11 DELIVERY

- A. The Lighting Control System Manufacturer shall coordinate delivery of all equipment with the Construction Manager and/or Electrical Contractor.
- B. If required by the Construction Manager or Electrical Contractor, equipment shall be delivered in a minimum of three separate shipments that shall include:
 1. Shipment #1: All items into which conduit is terminated including equipment racks, panels, control station back boxes, etc.
 2. Shipment #2: All items in which wiring is terminated including control station faceplates, etc.
 3. Shipment #3: All items that are not required until system activation by the Lighting Control System Manufacturer's field service representative. This shall include electronics modules, control consoles, gateways, monitors, cables, etc.
- C. Lighting Control System Manufacturer shall deliver all material to the job site suitably crated, packed, and protected, and bearing the manufacturer's identification label and the nomenclature of the product(s) found in each carton or crate.
- D. If, through no fault of the Owner, the timely completion of the work of this Section is imperiled, the Lighting Control System Manufacturer shall prevent or minimize any delay by shipping the required product to the job site by air freight, at no additional cost to the Owner.
- E. Bid price shall include full freight and insurance charges for all items to the job site.

1.12 JOB SUPERVISION

- A. When Contractor wiring is complete but prior to energizing the system, the Lighting Control System Manufacturer shall send a Factory-Authorized Technician to the job site to test and adjust the system.
- B. Factory-Authorized Technician shall instruct designated Owner's representatives in operation and maintenance of the Lighting Control System. Refer training requirements in Part 3.

1.13 QUALITY ASSURANCE

- A. Manufacturer: Minimum 10 years' experience in manufacture of architectural and theatrical lighting controls.
- B. Manufacturer's Quality System: Registered to ISO 9001:2000 Quality Standard, including in-house engineering for product design activities.
- C. Source Limitations: Obtain lighting control and power distribution components through one source from a single manufacturer wherever possible. All components shall be furnished by the Integrator regardless of source.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with 47 CFR, Subparts A and B, for Class A digital devices.
- F. Comply with NFPA 70.

1.14 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning with Substantial Completion, provide software support for two years. Support shall include 24-hour telephone support with guaranteed callback time of less than one hour.
- B. Upgrade Service: Update software and firmware to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading of software shall include operating systems where applicable. Upgrade shall include new or revised licenses for use of the software.
 - 1. Provide 30-day notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment, if necessary.

1.15 WARRANTY

- A. Lighting Control System Manufacturer agrees to make all repairs, including replacement of components and parts, made necessary due to defects in design, workmanship, and materials without additional cost to the Owner for a period of two years from the date of acceptance of the completed system.

- B. In the event of a system failure during the warranty period, manufacturer agrees to send to the job the necessary field service technician(s) within 24 hours of notification.
 - 1. Technician(s) shall remain on the job until all necessary repairs have been made and the system is operational to the satisfaction of the Owner.

PART 2 PRODUCTS

2.1 LIGHTING CONTROL SYSTEM MANUFACTURER

- A. Basis of Design Lighting Control System Manufacturer for the work of this Section shall be the following:
 - a. Electronic Theatre Controls (ETC) – Including Echo, Sensor3, Unison, and Paradigm
3031 Pleasant View Rd.
Middleton, WI 53562

Contact:
 - 1) Sylvia Sinclair – Regional Manager Midwest – ETC
 - a) 608-824-5155
 - b) Sylvia.sinclair@etcconnect.com
 - 2) Gabe Rice – Cross Light, Inc.
 - a) 216-533-4806
 - b) grice@crosslightinc.com
- B. Additional basis of design manufacturers for individual items as noted.
- C. Equal Manufacturers:
 - 1. Subject to Division 01 Specifications, other manufacturers may submit for consideration as equal to the design basis manufacturer products. Submittals for consideration must show conformance to project Specifications and system design requirements.
 - 2. Final determination of suitability shall be at the discretion of the Specifier.

2.2 DIMMER-PER-CIRCUIT RACKS FOR STAGE LIGHTING

- A. Provide 2.4 kW capacity plug-in *ThruPower* modules, each with primary circuit breaker in quantities shown on the drawings.
 - 1. The following modules control systems shall be provided for use in the theater dimming system.
Manufacturer Model Designation : ETC *Sensor3* / *CEM3* / *Sensor3 ThruPower* Modules /Unison *Paradigm*
- B. In addition to those shown on the drawings, provide the following spare parts:
 - 1. Four (4) dual 2.4 kW *ThruPower* modules.
 - 2. One (1) control electronics module for each type provided.

2.3 DIMMING EQUIPMENT RACKS

- A. All dimming equipment racks shall be UL listed and compatible with Ethernet and USITT DMX512 data transmission standards.
- B. Mechanical: Plug-in type modules are required for dimmer-per-circuit racks.
 - 1. The dimmer racks shall be deadfront, and fully accessible from the front by means of removable cover panels with hinged, lockable doors. The dimmer-per-circuit racks shall be floor supported.
 - 2. Framework assembly shall be of all-welded steel construction enclosed by not less than code gauge steel panels.
 - 3. Provide vibration isolation pads at the bottom of the dimmer rack to reduce the transmission of noise and vibration. Isolation pads shall be Mason Industries Type ND neoprene isolators sized for 1/2" static deflection or equal.
 - 4. Each module position shall contain guide tracks/rails to receive the module chassis.
 - 5. The entire rack interior and exterior shall be furnished in Manufacturer's standard color baked enamel over acid wash primer.
 - 6. Racks shall be constructed and shipped to the job site in separate sections.
- C. Ventilation:
 - 1. In order that the ambient temperature of the modules may be maintained at acceptable values, the Owner shall provide that the ambient temperature of the space in which the dimmer bank is located will not exceed 40 degrees Centigrade.
 - 2. Manufacturer shall construct the dimmer rack that shall permit a sufficient quantity of air to flow through the rack and maintain the dimmers at their optimum operating temperatures.
 - 3. Cooling may be affected either by convection or by forced air through the use of low speed exhaust fans.
- D. Electrical:
 - 1. Provide CEM3 power control electronics module with each dimmer rack.
 - 2. All control data lines, including common, shall be optically isolated from the console as well as from dimmer rack to dimmer rack. Control data lines shall also be protected by internal, user changeable fuses.
 - 3. All internal wiring shall be completed at the factory and the system components shall be delivered to the job site fully assembled and pre-wired, ready for installation by the electrical contractor.
 - 4. Terminals of the proper rating shall be provided for all external connections. Each terminal shall be clearly and permanently marked and numbered to correspond with Manufacturer's drawings. Terminal identification numbers shall correspond to actual dimmer numbers. Terminal identification numbering of 1-96 in each rack shall not be acceptable.
 - 5. All primary circuit breakers used throughout the system shall be fully magnetic, single pole, and silent acting when held. Secondary circuit breakers need not be fully magnetic type.
 - 6. All equipment necessary for the operation of this lighting control system shall be furnished with overload and short circuit protection.

7. All equipment, control, and protection devices shall be properly identified with permanent engraved labels mechanically affixed. Adhesive backed labels shall not be used.
8. Electrical power and control connections between the dimmers and the mounting racks shall be through permanent connectors at the rear of the rack. Mountings shall be such that the dimmers can be installed from the front of the rack without requiring access to the connectors or wiring.
9. Bussing shall permit the use of 120/208 v, 3-phase, 4 wire input service.
10. Main busses for dimmer-per-circuit rack shall be fully rated and common bussing through all racks shall be provided if required. Provide short circuit protection within the dimmer rack in accordance with code requirements and as directed by the Architect and the Engineer.
11. The entire dimmer rack shall be fully grounded in accordance with code requirements.

2.4 ETC THRUPOWER MODULES

A. General:

1. The modules shall be Sensor3 *ThruPower* modules designed for complete flexibility of choice for dimmed, non-dim, or hot power on each 20A branch circuit. A single *ThruPower* module shall provide the following:
 - a. Two dimmed outputs with 500 rise times, controlled by DMX, or
 - b. Two air gap relay switched outputs controlled by DMX, or
 - c. Two manual bypass constant power circuits controlled manually
2. The module may be configured to operate as two dimmers, two relays, or any combination of relay and dimmer from the CEM3 Power Control Module or from an ETC control console connected to a CEM3 system. Any single circuit may be set to bypass the dimmer using a switch on the front of the module.

B. Mechanical:

1. Module quantities shall be as shown on the drawings.
2. The dimmer-per-circuit racks, each individual *ThruPower* module shall be on a slide mount chassis. Each module shall slide into the dimmer-per-circuit rack and shall be provided with power and control connectors for plug-in to the mating receptacles that are permanently mounted. The face plate shall be provided with a handle for ease of withdrawal.
 - a. The dimmer modules shall be finished in baked enamel to harmonize with the finish of the dimmer equipment rack.
3. Modules shall be designed to operate within a normal ambient temperature range of 0 degrees Centigrade to 40 degrees Centigrade and in normal humidity of 20% to 90% with no adverse effects from thermal cycling within these ranges.
4. The module shall operate satisfactorily on 50 to 60 Hz., 110 to 140v AC.
5. Modules shall be ventilated by means of low-noise design cooling fans. If cooling is accomplished through the use of fans, a thermal cutout shall be appropriately mounted in each dimmer rack and shall automatically act to shut down the dimmer rack upon overheating, for any reason, preventing operation until the overheating condition has been removed, at which point the device will automatically reset.

6. Modules of the same capacity in the dimmer-per-circuit racks shall be interchangeable. Connectors and receptacles of modules of different capacity shall be polarized so that modules of different capacity cannot be interchanged.
 7. All power wiring within the module shall be 105-degree Centigrade 600v rated and multi-stranded to withstand heat and vibration. Power leads shall be a minimum of #10 for 2.4 kW units.
- C. Electrical:
1. Each *ThruPower* module shall contain:
 - a. Two circuit breakers
 - b. SCR solid-state dimming
 - c. Toroid filters
 - d. Power and control connectors
 - e. 120VAC remotely controllable mechanically latching air gap relay
 - f. Low voltage dc manual bypass override switch
 - g. One fuse per branch circuit for sufficient short circuit rating
 2. Modules that use Triac dimming shall not be acceptable. Modules which utilize an SCR or triac solid state switch as a dimmer bypass may void warranty of products they are powering and shall not be an acceptable means of bypass.
 3. Circuit breakers shall be fully magnetic, so the trip current is not affected by ambient temperature.
 - a. Circuit breakers shall be rated for tungsten loads having an inrush rating of no less than 20 times normal current.
 - b. Circuit breakers shall be rated for 100 percent switching duty applications.
 4. Each module shall use a solid-state module (SSM) consisting of two silicon-controlled rectifiers (SCRs) in an inverse parallel configuration, and all required gating circuitry on the high voltage side of an integral, opto-coupled control voltage isolator.
 - a. Rectifiers, copper leads and a ceramic substrate shall be reflow soldered to an integral heat sink for maximum heat dissipation.
 - b. The SSM shall also contain a control LED, a thermistor for temperature sensing, and silver-plated control and load contacts.
 - c. The SSM shall include an integral output LED, output voltage sensors and current sensors for feedback to the control module.
 - d. The SSM shall provide a parallel output connection which completely bypasses all SCR dimming including toroid filters and shall intercept the output prior to connection of the load sensing circuit such that the advanced features are still active during bypass.
 5. Each module shall have an associated, inductive type filter, mounted on acoustically damped vibration mounts, to accomplish the following:
 - a. Limit objectionable harmonics.
 - b. Limit the conducted radio frequency interference on supply lines.
 - c. Reduce acoustical noise in the dimmer load that would otherwise create noise of an acoustical origin in the lamp filaments on the output circuit.
- D. The rise time shall not be less than 500 microseconds measured at 90 degrees conduction angle from 10% to 90% of the output wave with the dimmer operating at maximum load.

2.5 INTEGRATED LIGHTING CONTROL PANELBOARDS (LCP-##)

A. General:

1. Each panelboard shall consist of up to 24 network-controlled motorized breakers. System shall be UL listed and labeled.
2. Circuit breakers shall be configured for single pole load control as scheduled.
3. Breakers shall be remotely operated by network communication link.
4. Panelboard shall have the capability to act as a standalone lighting control system with the following capabilities:
 - a. Internal Astronomical Time Clock for programmed events.
 - b. Accepts input from external button stations for recall of presets
 - c. Accepts input from external daylight sensors.
 - d. Signal arbitration to prioritize inputs by source (sACN, DMX, Preset Stations, Time Clock, etc).
 - e. Configurable loss-of-signal behavior including 'hold last look' and 'activate preset'.
5. USB port for upload of configuration files and firmware updates.

B. Physical:

1. Cabinets and Enclosures: NEMA 1 enclosure sized to accept required relays. Surface mounted cover as required with captive screws in a hinged, lockable configuration.
2. Interior: Interiors shall be provided with installed and tested motorized breakers and interface modules.
3. Panel side-mount enclosure shall provide low voltage control interface between network and motorized breakers, compliant with partitioning requirements for separation of line and low voltage.

C. Electrical:

1. Some Panelboards shall be equipped with a hydraulic/magnetic full-load-rated main circuit breaker, as noted on each panel's associated Panelboard Schedule on QT-series Drawings. AIC rating as specified by Electrical Engineer.
2. Power Supply: Transformer assembly shall include internal overcurrent protection with automatic reset and metal oxide varistor protection against power line spikes.
3. Circuit Breakers shall contain solenoid actuators to move poles between open and closed positions. Overcurrent conditions shall cause a closed contact to open into 'tripped' position for ready identification of state:
 - a. Coil:
 - 1) Magnetically held, momentary coil activation (50 milliseconds)
 - 2) 2.2 VA max per breaker to allow simultaneous or sequenced control of up to 10 breakers per control wire run.
 - 3) Split coil - 1/2 for ON, 1/2 for OFF.
 - b. Power Contacts:
 - 1) 20A or 30A tungsten and NEMA electronic ballast rated, as scheduled.
 - 2) Rated for 50,000 ON/OFF cycles at full load.
 - 3) Support #6 - #14 AWG solid or stranded wire.
 - 4) 120V and 277V rated.
 - 5) FCC approved for commercial use.

- D. Control Electronics:
1. Control electronics shall be integral to the panel side enclosure, providing network and user interface for individual control of motorized circuit breakers in panelboard.
 2. Configuration of network addressing shall be by means of digital graphical display interface or by network port. Status LEDs shall indicate presence of Power and DMX signal.
 3. Control and communication signals shall be accommodated by means of system network and DMX512 interfaces.
 - a. The system network interface shall serve as primary integrating means between the rack electronics and the lighting control network, and shall also support remote configuration, file storage, playback, and monitoring capabilities from other devices on the network.
 - b. There shall be at least one optically isolated DMX512 input and one optically isolated DMX512 output per panel.
 4. Furnish ride-through power supply to permit electronics to remain energized during short duration loss of power, such as during transfer to backup generator.
 5. Furnish 0-10v control interface card in each panel.
- E. Basis of Design
1. Basis of Design for Integrated Lighting Control Panelboards shall be:
 - a. Electronic Theatre Controls series as indicated on drawings.

2.6 EMERGENCY LIGHTING TRANSFER SYSTEM (ELTS-##)

- A. General:
1. The Emergency Lighting Transfer System shall provide automatic transfer of branch circuits from normal to emergency power when normal power fails. Each system shall consist of power transfer switches and control circuitry interconnected to provide complete, automatic protection
 2. The ELTS shall transfer designated lighting load branch circuits from dimmers or secondary control outputs to a second power source in the event of a loss of power, a normal system failure, or activation of fire alarm.
 3. The system shall comply with ANSI / UL1008 Transfer Switch Equipment, ANSI / NFPA 110 Standard for Emergency and Standby Power Systems, and ANSI / NFPA 70 (NEC), including Article 700 safety standards. Emergency transfer systems that do not comply with the below stated NEC articles and sections shall not be permitted
 - a. Satisfies requirements of the National Electrical Code (NFPA 70):
 - 1) Article 700 – Emergency Systems
 - 2) Section 518.3(C) – Assembly Occupancies
 - 3) Section 520.7 – Theatres and Similar Locations
 4. The ELTS shall be a self-contained system for up to 24 circuits at 20 amps and available for single or three phase power (120/208V). The unit shall be available with discrete emergency branch circuit feeds from an external circuit breaker panel.

B. Transfer Switch

1. The switch shall be a UL 1008 LISTED, electrically operated and mechanically held (maintained) transfer switch.
2. The switch shall be positively locked and unaffected by voltage variations or momentary outages so constant contact pressure is maintained and temperature rise at the contacts is minimized.
3. The switch shall be mechanically interlocked to ensure only one of the two possible positions, either Normal or Emergency.
4. Each switch shall be configured as guaranteed break-before-make
5. Built-in fuses shall provide up to 65000A Short Circuit Current Rating (SCCR) on connected emergency circuits.
6. Built-in fuses class G shall be provided on each output for compliance with NEC Section 700 Coordination – larger upstream breakers cannot be tripped by downstream branch circuit faults.
7. Switch contacts shall withstand transfer without welding, with 180° phase displacement between Normal and Emergency power sources, both sources energized and with 80% load.
8. Transfer switch contacts shall be rated for mixed loads, including electric discharge lamps and tungsten filament lamps.
9. Transfer switches shall be rated for 6000 cycles at full tungsten load.

C. Control Circuit

1. The control circuitry shall direct the operation of the transfer switch.
2. User configurable timing delays shall be provided for power transfer between:
 - a. loss of normal power and the transfer to emergency up to 10 seconds.
 - b. restoration of normal power and the transfer from emergency back to normal power up to 60 seconds.
3. A normally closed dry contact closure fire alarm input shall be provided.

D. Operation

1. Transfer to alternate supply will occur when normal supply voltage drops below 80V, for the A phase, the B, or C phase.

2. A self-supervising isolated signal input shall be provided for connection to the facility fire alarm. The ELTS shall automatically transfer the loads to the Emergency power source when the facility fire alarm is activated as part of a normally-closed loop.
3. A key-operated switch shall be provided to manually control the ELTS. All automatic functions shall override this control. Two indicator lights shall be provided to show the position of the transfer switch.
4. All automatic functions shall override remote control functions. Any combination of open or shorted wiring to remote stations shall not affect automatic functions, or disable the local switch.

E. Enclosure

1. The ELTS shall be mounted in a NEMA 1 type enclosure finished in textured epoxy paint. It shall be equipped with a hinged locking door. Material shall be no less than 14 gauge steel.
2. An enclosure containing no more than 12 (twelve) 20A circuits shall be 36”H x 24”W x 8.5”D.
3. An enclosure containing up to 24 (twenty-four) 20A circuits shall be 48”H x 30”W x 8.5”D.
4. The enclosure shall provide power distribution and branch circuit protection for all emergency power circuits. Systems requiring external emergency power circuit protection shall not be acceptable.
5. The enclosure shall be separate and independent of all other equipment. In no instance shall the ELTS be enclosed in a dimmer rack or in an enclosure containing other equipment.
6. The system shall be provided with an approved overlay mounted on the front of the enclosure, stating, “EMERGENCY LIGHTING TRANSFER SYSTEM”.
7. The enclosure shall be provided with an approved label indicating that the system is UL1008 LISTED.

2.7 LIGHTING CONTROL NETWORK AND INTERFACE

A. General:

1. Furnish and install a complete lighting control network system, capable of supporting the specified relay panels, stage lighting control consoles, architectural control stations, time and calendar schedules, and related network devices indicated on the drawings and in this Specification.

2. The network shall use Category 5e Ethernet distribution to communicate between control consoles, panels, nodes, and computers.
 3. Manufacturer specified wiring and topology shall be used to communicate with control stations, sensor devices and relay panels.
- B. Network Components:
1. Control Processors:
 - a. Provide architectural processor as required to interface lighting control relay panels, control stations, sensors, system I/O contacts, and any ap-purtenant devices or equipment required for system to function fully as intended. Processor shall provide necessary programming interface for setup and configuration of system and system components.
 - b. Furnish one backup processor, which may be used as a replacement processor for either performance venue.
 2. Ethernet switches and patch bays:
 - a. Provide Ethernet Switches in port quantities as required for devices in system, plus 25% spare for future expansion at each rack location.
 - b. Provide patch bays in port quantities as required for devices in system, plus 25% spare for future expansion at each rack location.
 3. DMX signal splitters:
 - a. Provide ANSI/USITT E1.1-2008 compliant DMX512 opto-isolating splitters, in quantity and configuration of inputs and outputs as required for system.
 - b. All DMX signal cables terminating at the splitter location shall be outfitted with 5-pin XLR connectors or RJ45 connectors as necessary to permit user patching where required. This includes signals to Ethernet-to-DMX gateway node receptacles, dimmers, and relay panels.
 4. Equipment Racks:
 - a. Provide wall or floor mounted 19" equipment racks with mounting rails, hinged locking door, and sized to accommodate all required processing equipment including that indicated above in quantities shown on drawings plus any additional required for complete system.
 - b. Each rack shall have minimum of one four-space contiguous blank section with cover plate for future equipment addition.
 - c. Each rack shall be furnished with a three-space pull out drawer for storage of manuals, patch cabling, and user notes.
 - d. Racks shall be Middle Atlantic SR series, EWR series or equal.
 - e. Racks shall be furnished with an uninterruptible power supply (UPS) battery backup.
 - f. Coordinate electrical power connections for rack contents.
 5. Ethernet cabling:
 - a. Ethernet cabling used in theatrical lighting control network shall have the following properties:
 - 1) Comply with NEMA WC-63.1 Category 5e, UL verified.
 - 2) Comply with TIA 568.C.2.
 - 3) Outer jacket shall be PURPLE in color.
 - b. Furnish and install RJ45 Category 5e patch cables as necessary to fully patch between all network switch ports and patch bay ports in each rack location, plus 20% spares.

- c. Furnish additional RJ45 Category 5e patch cables to allow connection of distributed Ethernet ports to node devices in the performance spaces. Refer to Theatrical Lighting Fixtures and Accessories Schedule on drawings for lengths and quantities to be furnished.
6. DMX Network Cabling:
 - a. Furnish and install 5-pin XLR M/F DMX jumper patch cables as necessary to fully patch between all DMX-512 splitter ports and DMX patch points, racks, or other DMX devices at equipment racks.
 - b. Furnish additional 5-pin XLR M/F DMX jumper cables to allow connection of DMX node devices to stage lighting fixtures and other DMX-controlled devices in the performance spaces. Refer to Theatrical Lighting Fixtures and Accessories Schedule on drawings for lengths and quantities to be furnished.
7. Ethernet Taps:
 - a. Mounting type as shown on drawings
 - b. Each tap shall have two RJ45 Ethernet connectors discretely fed from patch panel, unless otherwise noted.
8. Ethernet Nodes:
 - a. Mounting as shown on drawings, furnish with necessary hardware.
 - b. Each node with one, two, or four each 5-pin XLR connectors configurable for DMX512 input or output, or for ESTA/ANSI E1.20 two-way communication. Each connector may be addressed to discrete universes.
 - c. Surface-mount nodes shall have Ethernet wire feed from patch panel to device.
 - d. Portable nodes shall have one RJ45 Ethernet connection to permit patching into any Ethernet tap shown on drawings. Each shall be outfitted with Light Source MAB mega clamp or equal aluminum pipe clamp.
 - e. Refer to drawings and schedules for quantity of each node type to be furnished.
9. Input/Output devices for communication with other systems:
 - a. Provide dry contact closures configurable as input or output signals as needed to connect with fire alarm system, effects controls, shading systems, and future interfaces.

2.8 STAGE LIGHTING CONTROL CONSOLES

A. General

1. For each console, furnish all power and interface devices, cabling, and accessories necessary for a fully functioning system.
2. Furnish the following with each console (unless otherwise noted):
 - a. Rolling road case
 - b. Dust cover
 - c. Portable UPS battery backup
 - d. Power cables
 - e. Ethernet patch cable or DMX512 patch cable (where applicable), 30'-0" in length
 - f. USB keyboard and mouse (where applicable)
 - g. Two (2) USB drives for show file storage

- B. Proscenium Theater
 - 1. ETC – Ion XE 2K
 - 2. Eos FW 20 Fader Wing
 - 3. Accessories
 - a. Two 17” Multi-Touch Monitors
 - b. Two LED gooseneck task lights with XLR connectors
 - c. Wi-Fi router and Ethernet patch cable, for remote connection from Owner-provided mobile devices.

- C. Multipurpose Room
 - 1. ETC – Element 2 1k
 - 2. Accessories
 - a. Two 17” Monitors

2.9 ARCHITECTURAL LIGHTING CONTROL STATIONS (HOUSE LIGHT STATIONS)

- A. General
 - 1. Stations shall serve as user interface to recall and manipulate common room lighting presets via the lighting control network. Stations shall occur in the following styles:
 - a. Preset stations with buttons and faders
 - 1) Preset stations shall have an LED constantly illuminated when the system is powered.
 - 2) When a preset is activated, LED shall be illuminated on every preset control station capable of controlling that preset.
 - 3) Control station faceplates shall be in color shown on the drawings with engravings as noted.
 - 4) Preset/Fader stations shall fit in an industry standard back box furnished by Electrical Contractor and shall have faceplates with no visible fasteners.
 - 5) Faceplates shall be engraved with custom labeling as determined by Owner and/or Specifier during shop drawing review.
 - 6) Each preset and fader can be discretely programmed for scene recall, timed fades, on/off toggle, pile-on, and macro sequences, as indicated on drawings and by Owner and/or Specifier during system commissioning.
 - 7) Stations shall operate on low voltage network bus as specified by Manufacturer, or on Category 5e cable with P.O.E., and shall be programmable via this network.
 - b. Fixed Touchscreen stations
 - 1) Minimum 16-bit color with resolution of minimum 600x360. Station screens shall have auto-fade with adjustable timeout and shall adjust brightness proportionally to room ambient light levels.

- 2) Station programming shall support up to 10 discrete screen shots configurable for preset recall, virtual faders, clock and time scheduling functions, dynamic color wheel for LED fixture color selection, and group selection and assignment. Station shall be configured with code lockout on home page.
- 3) Design display graphics showing building areas controlled; include the status of lighting controls in each area.

2.10 ARCHITECTURAL LIGHTING DMX DISTRIBUTION SYSTEM

- A. Provide bi-directional DMX repeater(s) as required with sufficient DMX outputs for control of DMX enabled architectural lighting fixtures.
- B. Provide emergency DMX bypass device(s) as noted on drawings, for lighting control override during loss of power or emergency evacuations. Bypass device(s) shall receive the following feeds:
 1. Panic signal from Fire Alarm Control Panel
 2. Loss of power signal from Emergency Bypass Detection Kit with power sense feed

PART 3 EXECUTION

3.5 EXECUTION

- A. Verify that surfaces are ready to receive work.
- B. Verify field dimensions and coordinate physical size of all equipment with the architectural requirements of the spaces into which they are to be installed. Allow space for adequate ventilation and circulation of air.
- C. Verify that required utilities are available, in proper location, and ready for use.
- D. Beginning of installation means installer accepts existing conditions.
- E. Install in accordance with manufacturer's instructions and approved shop drawings.
- F. All wiring shall be installed in conduit.
- G. All branch load circuits shall be live tested before connecting the loads to the lighting control panels.

3.6 SUPPORT SERVICES

- A. System Startup
 1. Upon completion of installation, Contractor shall notify the Lighting Control System manufacturer that the system is ready for formal checkout and programming. No power shall be applied to the Lighting Control System unless specifically authorized by written instructions from the manufacturer.

2. Manufacturer shall provide Factory-Authorized Technician to confirm installation and operation of all system components.
- B. Testing:
1. System shall undergo complete functional testing by a Factory-Authorized Technician. All loads shall be tested live for continuity and freedom from defects and all control wiring shall be tested for continuity and connections prior to energizing the system components.
 2. Contractor shall be responsible for correction of any improper wiring or component installation as identified by the Factory-Authorized Technician during testing. Contractor shall be responsible for any return visits by Factory-Authorized Technician resulting from lack of system readiness for checkout or from any incomplete or incorrect wiring or installation.
- C. Initial Programming
1. Programming of initial button assignments, touch screen page layouts, normal and emergency presets, control priorities, sensor settings, time clock events, etc, shall be performed by a Factory-Authorized Technician. Consultant may provide, in Contract Drawings, supplemental materials, or both, instructions for initial programming; however, all final decisions regarding programming shall be at the direction of the Owner.

3.7 OWNER TRAINING

- A. General
1. Manufacturer's authorized technician shall perform Owner Training.
 2. Class size is limited to 12 participants.
 - a. Owner shall provide a list of participants by title.
 3. The Lighting System Integrator shall schedule instruction with the Owner's designated representatives. Agenda shall be sent in advance. All O&M materials, as designated in this Specification, shall be available at the time of training.
 4. Instruction shall not necessarily follow immediately after the system check-out and activation.
 5. Instruction shall be independent of the system check-out and activation. Length of engineering check-out and activation shall not affect the length of instruction time.
 6. Written documentation of Owner training shall be provided to the Owner upon completion.
 - a. Form to include:
 - 1) The date, time, and location of training.
 - 2) Name, title, company, and signature of trainer.
 - 3) Name, title, and signature of all participants.
 - 4) Topics covered at training.
 - b. If training is non-continuous, provide one form for each training segment.
 7. Training may be video and audio recorded by the Owner at the Owner's expense.
- B. Training Sessions
1. Up to 24 hours of Owner training to include the following:
 - a. Minimum of three (3) separate training sessions with Owner, as follows:

- 1) First session shall occur at conclusion of startup and system commissioning and shall include eight hours training time with Owner representatives. This session shall include the following general subjects, but shall be tailored to Owner's preference at time of training:
 - a) General system overview
 - b) Routine care and maintenance
 - c) Operation of relay panels
 - d) House Light Station operation and configuration, including review of initial programming provided by Consultant
 - e) Lighting Control Console introduction and basic programming
 - f) Review of warranty and software updates
- 2) Second session shall occur no less than two weeks following substantial completion, but within one month of initial training. This session shall include up to an additional eight hours training time with Owner representatives. This session shall include the following general subjects, but shall be tailored to Owner's preference at time of training:
 - a) In-depth Lighting Control Console operation and programming
 - b) House Light Station preset review and adjustment to reflect actual operational needs
 - c) Other review as requested by Owner
- 3) Third session of additional eight hours training time shall occur no less than one month after substantial completion, but within three months of initial training. Format and timeline shall be similar to the second session.

END OF SECTION 116103

SECTION 116106 – THEATRICAL WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes all labor, materials, equipment, and services necessary to manufacture and deliver to job site Theatrical Wiring Devices for stage lighting circuits, for installation by Electrical Contractor, as shown on the drawings and/or specified herein, including but not limited to the following:
 - 1. Recessed receptacle boxes (including backboxes)
 - 2. Surface-mount receptacle boxes
 - 3. Pipe-mount receptacle boxes
 - 4. Batten-mount connector strips with cable management
- B. It shall be the responsibility of the Theatrical Wiring Device Manufacturer to furnish equipment complete in all respects and to provide any additional equipment required to fulfill the intent of the drawings and Specifications whether or not such items are herein specified or indicated.

1.3 SUBMITTALS WITH BIDS

- A. Submit with bid a schedule listing the following time estimates:
 - 1. Length of time required to prepare shop drawings.
 - 2. Length of time required to supply all equipment.

1.4 SUBMITTALS

- A. Theatrical Wiring Device Manufacturer shall prepare and submit complete shop drawings according to requirements set forth in the Contract Documents, to include the following:
 - 1. Shop drawings shall show bussing for each outlet box and shall utilize the exact circuit numbering method detailed on the drawings.
 - 2. Provide equipment data sheets for all components being furnished, clearly indicating specific part number, options, and accessories. Data shall include construction materials, dimensions, sizes, listings, electrical and mechanical connections, fasteners, and associated information pertinent to identifying function and quality of the components.
- B. Furnish catalog cuts, drawings, and/or descriptive material of catalog items as requested by the Architect.

- C. Furnish all the above for review by the Architect prior to commencing any work.
 - 1. Such review does not relieve the Theatrical Wiring Device Manufacturer of the responsibility of providing equipment in accordance with this Specification.
- D. Any deviation from this Specification is to be "starred" and noted in letters a minimum 1/4" high.
 - 1. For a deviation to be considered it shall upgrade the quality of the equipment or respond to a field condition.
- E. It is the responsibility of the Theatrical Wiring Device Manufacturer to submit shop drawings on a schedule that allows for adequate time for review. Proposals for contract time extensions due to delayed shop drawing submittals shall not be allowed.

1.5 MANUFACTURING STANDARDS

- A. All work shall be manufactured in accordance with the latest editions of applicable publications and standards of the following organizations:
 - 1. National Electric Code (NEC) and all prevailing local and state regulations including:
 - a. ANSI/NFPA 70: National Electrical Code
 - 2. National Electrical Manufacturers Association (NEMA) including:
 - a. NEMA WD 1: General Purpose Wiring Devices
 - b. NEMA WD 6: Wiring Device Configurations
 - 3. Entertainment Services and Technology Association (ESTA) including:
 - a. ANSI/ESTA E1.24-2012 (R2017): Dimensional Requirements for Stage Pin Connectors
 - 4. Occupational Safety & Health Act (OSHA)
- B. All applicable products shall bear label of Underwriters Laboratories (UL).
- C. All equipment shall be thoroughly tested in Manufacturer's shop prior to shipment to insure mechanical and electrical integrity.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery shall be as required in Construction Documents.
- B. The Theatrical Wiring Device Manufacturer shall coordinate delivery of all equipment with the Construction Manager and/or Electrical Contractor.
- C. Theatrical Wiring Device Manufacturer shall, if requested by the Construction Manager and/or Electrical Contractor, deliver Theatrical Wiring Devices items in the following two separate shipments:
 - 1. Shipment #1: Shipment shall include back boxes for all Theatrical Wiring Device items so that the Electrical Contractor may terminate all conduit.
 - 2. Shipment #2: Shipment shall include faceplates for all Theatrical Wiring Device items.

3. Theatrical Wiring Device Manufacturer shall notify the Construction Manager and/or Electrical Contractor 24 hours prior to delivery of equipment.
- D. Deliver all material to the job site suitably crated, packed, and protected.
 1. Each crate or carton shall be clearly marked on the outside with the Manufacturer's identification label and the nomenclature of the product contained within.
- E. Bid price shall include full freight and insurance charges for all items to the job site.
- F. If, through no fault of the Owner, the timely completion of the work of this section is imperiled, the Theatrical Wiring Device Manufacturer shall prevent or minimize any delay by shipping the required products to the job site by air freight at no additional cost to the Owner.

1.7 WARRANTY

- A. The Theatrical Wiring Device Manufacturer shall assure that this equipment is provided free of defects in materials and workmanship and shall provide a warranty under this contract for a period of two year from the date of final acceptance.
- B. During the warranty period, repair or replacement of defective materials and/or repair of faulty workmanship shall be provided, at no cost to the Owner, within 10 days written notice of the defect(s).

1.8 THEATRICAL WIRING DEVICE MANUFACTURERS

- A. Theatrical Wiring Device Manufacturers for work of this section shall include:

1. Altman Lighting
57 Alexander St.
Yonkers, NY 10701
Contact: Nick Champion nchampion@altmanltg.com
800-425-8626
2. Electronic Theatre Controls (ETC)
3031 Pleasant View Road
Middleton, WI 53562
Contact: Rob Raff rob.raff@etcconnect.com
3. Lex Products
15 Progress Dr.
Shelton, CT 06484
Contact: Tom Siko tsiko@lexproducts.com
800-643-4460
4. Performance Electric Inc.
126A McDougall Ct.
Greenville, SC 29607

Contact: Larry Easterday save@performancedistro.com
864-288-2021

5. SSRC
 170 Fortis Dr.
 Duncan, SC 29334
 Contact: Aaron Clark aclark@ssronline.com
 864-848-9770

6. Stagecraft Industries Inc.
 5051 N. Lagoon Ave.
 Portland, OR 97217
 Contact: Kevin Shetterly kevins@stagecraftindustries.com
 503-286-1600

PART 2 - PRODUCTS

2.1 GENERAL

A. Load Connectors

1. Load connectors for stage lighting circuits shall be stage pin (2P&G). Connectors and Receptacles shall be spaced and mounted as indicated.
2. Multicable receptacles shall be Amphenol Socapex 419-AR series. Provide screw-on dust cover with attachment cable for each multicable receptacle.

2.2 LABELING

A. All Theatrical Wiring Devices containing load connectors shall have circuit numbering clearly labeled.

1. Surface, recessed, and pipe-mount boxes:
 - a. 1/4" tall white numbers engraved directly into a black lamincoid or plastic laminate label plate attached with non-corroding screw fasteners or rivets.
 - b. Flush receptacles: label shall be directly above receptacle
 - c. Pigtail connectors: label shall be directly above pigtail entry to box
 - d. Receptacles and labels shall face the direction indicated on drawings.
2. Connector Strips
 - a. 2" tall white numbers.
 - b. Flush receptacles: label shall be located directly above receptacle
 - c. Pigtail connectors: label shall be located directly on pigtail connectors and directly above pigtail entry to raceway.

B. All low voltage control devices within Theatrical Wiring Devices shall have device name clearly labeled with minimum 1/4" tall white characters on black background. Label shall be directly above control port.

C. All faceplate labels shall be as shown on the drawings and verified in Shop Drawings.

THEATRICAL WIRING DEVICES

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- D. Furnish and install removable adhesive labels for each Theatrical Wiring Device faceplate and back box, indicating the Wiring Device Number (i.e. 'WD-5') and serial code to facilitate programming and commissioning.

2.3 RECESSED AND SURFACE-MOUNT RECEPTACLE BOXES

- A. Provide recessed and surface-mount receptacle boxes as listed herein and shown on the drawings.
- B. Recessed box covers shall flange over the back-box by no less than ½" per side.
- C. Steel face plates with receptacles shall be constructed of minimum 18-gauge steel, finished with a powder-coat paint treatment in the color noted on drawings.
 - 1. Circuit numbers shall be engraved directly into a black lamincoid or plastic laminate label plate attached with non-corroding screw fasteners or rivets.
 - 2. Provide mounting holes on face plate.
- D. Provide solid copper buss bars for each receptacle plate as follows:
 - 1. Adjacent neutral pairs for each circuit.
 - 2. Adjacent hot leg pairs for each circuit.
 - 3. Grounds for each receptacle plate.
- E. Boxes shall be prewired with 125 degrees Celsius high temperature wire to molded barrier terminal blocks.
- F. Connector type shall be shown on drawings.
- G. Back boxes for surface and recessed mounted receptacle boxes shall be constructed of minimum 18-gauge steel, finished with a powder-coat paint treatment in the color noted on drawings.
- H. Pigtails (where applicable) shall be fabricated of 12/3 or 12/4 SOW type cable with appropriate strain reliefs.

2.4 PIPE-MOUNTED RECEPTACLE BOXES

- A. Provide pipe-mount receptacle boxes as listed herein and shown on the drawings.
- B. Steel face plates with receptacles shall be constructed of minimum 18-gauge steel, finished with a powder-coat paint treatment in the color noted on drawings.
 - 1. Circuit numbers shall be engraved directly into a black lamincoid or plastic laminate label plate attached with non-corroding screw fasteners or rivets.
 - 2. Provide mounting holes on face plate.
- C. Provide solid copper buss bars for each receptacle plate as follows:
 - 1. Adjacent neutral pairs for each circuit.
 - 2. Adjacent hot leg pairs for each circuit.
 - 3. Grounds for each receptacle plate.

- D. Boxes shall be prewired with 125 degrees Celsius high temperature wire to molded barrier terminal blocks.
- E. Connector type shall be shown on drawings.
- F. Back boxes shall be constructed of minimum 18-gauge steel, finished with a powder-coat paint treatment in the color noted on drawings.
- G. Boxes shall attach to pipes with U-bolts.
- H. Pigtails (where applicable) shall be fabricated of 12/3 or 12/4 SOW type cable with appropriate strain reliefs.

2.5 PIPE-MOUNTED CONNECTOR STRIPS WITH CABLE MANAGEMENT

- A. Provide pipe batten mount continuous connector strips with flush mounted receptacles as listed herein and as shown on the drawings.
 - 1. For each connector strip, provide mounting brackets and associated hardware as required to hang the connector strip on the stage rigging system 1-1/2" NPS steel pipe batten.
 - 2. Brackets for attachment to or suspension from structure or rigging shall be fabricated from ASTM A36 steel and shall use grade 5 rated hardware. Attachment spacing shall be no greater than 5'-0" on center and shall comply with Manufacturer's installation instructions.
- B. Connector strips shall be constructed of minimum 18-gauge steel or minimum 1/8" aluminum, finished with a powder-coat paint treatment in the color noted on drawings.
- C. Flush receptacles shall be mounted at spacings as shown on the drawings.
- D. Data receptacles (such as RJ45 ports or DMX Outputs) shall be provided as indicated on drawings, mounted at spacings as shown on drawings, and shall be flush-mounted to the box cover.
 - 1. Control terminations and distribution shall be within a portion of the raceway that is separated by a voltage barrier from the line-voltage portion.
- E. Connector strip shall be factory pre-wired with 125 degrees Celsius high temperature wire to double sided, numbered molded barrier terminal strips at end of each connector strip.
- F. Circuit numbers shall be provided as shown on the drawings.
- G. Where connector strips are too long for shipping, the strips shall be shipped in segments and folded over one another with the internal wiring intact.
 - 1. Provide splice hardware as required.
- H. Provide cable management devices for certain linesets, where indicated on drawings.
 - 1. Theatrical Wiring Device Manufacturer shall coordinate gridiron junction box location with Electrical Contractor.

- I. Pigtails (where applicable) shall be fabricated of 12/3 or 12/4 SOW type cable with appropriate strain reliefs.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify that equipment is properly wired, terminated, and ready for electrical connection and energization.

3.2 PREPARATION

- A. Review equipment submittals prior to installation and electrical rough-in. Verify location, size, and type of devices. Coordinate details of equipment connections with supplier and Specifier.

3.3 INSTALLATION

- A. Use wire and cable with insulation suitable for temperatures encountered in heat-producing equipment where appropriate.

3.4 OPERATION AND MAINTENANCE MANUALS

- A. Upon completion of installation, the Manufacturer shall compile Operation and Maintenance manuals in quantity identified in Division 1, bound in hard ring binders. Minimum of three manuals shall be furnished to Owner, one hard copy and two electronically on portable USB drives.
- B. Complete updated copy of record shop drawings, indicating all changes and modifications implemented during installation.
- C. Catalog cut sheets for all device types.
- D. Maintenance and care instructions and recommendations.
- E. Warranty information.

END OF SECTION 116106

SECTION 116109 – THEATRICAL LIGHTING FIXTURES AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes all labor, materials, equipment and services necessary to furnish and deliver to the job site, for installation by others, the Stage Lighting Fixtures and Accessories Package as indicated in the drawings, including but not limited to, the following:
 - 1. Stage lighting fixtures and accessories.
 - 2. Hanging hardware.
 - 3. Power and data cable jumpers.
 - 4. Miscellaneous items.
- B. RELATED DRAWINGS
 - 1. Refer the following schedules on the drawings for a list of Stage Lighting Fixtures and Accessories to be provided.

1.3 SUBMITTALS WITH BID

- A. Stage Lighting Fixture Supplier shall provide a list of all items with manufacturer's catalog numbers for each item.
- B. Bid shall include a unit price for each item listed in the Stage Lighting Fixtures and Accessories Package
 - 1. Unit pricing may be used by the Owner to determine the value of any additions to or deletions from the equipment list.
 - 2. Failure to provide unit pricing may result in the disqualification of the bid.
- C. Stage Lighting Fixture Supplier shall submit with bid the following time estimates
 - 1. Length of time required to supply all equipment.
 - 2. Length of time required to install all equipment.

1.4 SUBMITTALS

- A. Stage Lighting Fixture Supplier shall submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

- B. Shop drawings shall include catalogue cuts of all items included in the Stage Lighting Fixtures and Accessories Package.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery shall be as required in the Contract Documents.
 - 1. Stage Lighting Fixture Supplier shall confirm the delivery dates with the Construction Manager and/or Owner a minimum of 30 days in advance of scheduled delivery.
- B. Bid price shall include full freight and insurance charges for delivery of all equipment to the job site.
- C. Deliver all material to the job site suitably crated, packed, and protected.
 - 1. Each crate or carton shall be clearly marked on the outside with the manufacturer's identification labels and the nomenclature of the product contained within.
- D. Delivery and placement shall be coordinated with job site conditions, delivered prior to substantial completion yet after general construction and cleanup has been completed, so that fixtures remain in factory condition and safe from work site hazards.
- E. Stage Lighting Fixtures and Accessories shall not be delivered until the job site is suitable. Equipment shall not be exposed to dust, paint, weather, or similar damaging conditions.

1.6 WARRANTY

- A. The Stage Lighting Fixture Supplier shall assure that this equipment is provided free of defects in materials and workmanship and shall provide a warranty under this contract agreeing to make all applicable repairs, including replacement of materials, at no cost to the Owner for a period of one year from the date of final acceptance.
- B. If, through no fault on the part of the Owner, the Stage Lighting Fixture Supplier is unable to meet the required delivery dates established at the time of the signing of an agreement, Stage Lighting Fixture Supplier agrees to furnish substitute equipment of the same quantity and of comparable type and quality to the job site.
 - 1. This equipment will be extended to the Owner at no additional cost until specified equipment is delivered.

1.7 MANUFACTURING STANDARDS

- A. All work shall be manufactured in accordance with the latest editions of applicable publications and standards of the following organizations:
 - 1. National Electric Code (NEC) and all prevailing local and state regulations including:
 - a. ANSI/NFPA 70: National Electrical Code
 - 2. Entertainment Services and Technology Association (ESTA) including:
 - a. ANSI/ESTA E1.11-2008: USITT DMX512-A
 - b. ANS/ESTA I E1.20-2010: Remote Device Management over USITT DMX512

- c. ANSI/ESTA E1.24-2012 (R2017): Dimensional Requirements for Stage Pin Connectors
- d. ANSI/ESTA E1.27-1-2006 (R2016): Portable Control Cables for DMX512

PART 2 - PRODUCTS

A. STAGE LIGHTING FIXTURES

- 1. Stage lighting fixtures shall be supplied with all standard equipment, including the following, unless otherwise noted:
 - a. Connector type as scheduled, with min 36", three-wire lead, including separate power input lead with scheduled connector, if required.
 - b. Center pivot type "C" clamp and yoke, or other hanging hardware as scheduled.
 - c. One lamp per lamp socket, where applicable, as scheduled.
 - d. One black safety cable.
 - e. Gel frame
 - f. All other accessories as noted on the Stage Lighting Fixtures and Accessories Schedules

B. POWER JUMPER CABLES

- 1. Unless otherwise noted, all power jumpers shall be made of black type "SO" (extra hard usage) #12 cable and installed connectors as scheduled.
 - a. All jumpers shall be made with strict observance of polarity.
- 2. Two-fers shall be of black type "SJ" (junior hard service), three-conductor, #12 cable with installed connectors as scheduled.
 - a. All two-fers shall be made with strict observance of polarity.
 - b. 'Y' type splitters shall have molded splitter block.
- 3. All PowerCON to PowerCON fixture to fixture Power Thru jumper cables shall be made of black type "SJ" (junior hard service), three-conductor, #12 cable with installed standard Neutrik PowerCON connectors.

C. DATA JUMPER CABLES

- 1. Category Cable Jumpers
 - a. Unless otherwise noted, all Category Cable data cable jumpers covered by this Specification shall be 'tour-grade' with RJ45 Ethercon connectors and heavy-duty jackets.
- 2. DMX Cable Jumpers
 - a. Unless otherwise noted, all DMX data cable jumpers covered by this Specification shall be 'tour-grade' with 5-pin XLR connectors and heavy-duty jackets.

D. STAGE LIGHTING FIXTURES & ACCESSORIES

- 1. Provide the following fixtures and accessories for the Proscenium Theater:

Quantity	Description	Manufacturer & Model
36	575W Ellipsoidal spotlight	ETC Source 4
36	LED Spotlight	ETC ColorSource Spot
24	LED Wash fixture	ETC D60

24	LED PAR fixture	ETC ColorSource PAR
8	LED Cyclorama fixture	Altman LED Spectra Cyc 100
60	Pattern holders	
92	Top hats	
36	Barn doors	
12	Work light	Altman LED worklight
1	Ghost light	
1	HTI Followspot	
24	5' jumper cable	
24	10' jumper cable	
24	25' jumper cable	
18	50' jumper cable	
8	100' jumper cable	
12	5' LED fixture daisy-chain cable	ETC PowerThru cable
12	10' LED fixture daisy-chain	ETC PoewrThru cable

2. Provide the following fixtures and accessories for the Multi-Purpose Room:

Quantity	Description	Manufacturer & Model
36	575W Ellipsoidal spotlight	ETC Source 4
12	5' jumper cable	
12	10' jumper cable	
12	25' jumper cable	
8	50' jumper cable	
4	100' jumper cable	

PART 3 - EXECUTION

3.1 LIGHTING FIXTURE PREPARATION

- A. After delivery, each stage lighting fixture shall undergo the following:
1. Unpacking from carton.
 2. Assembly as required.
 3. Installation of lamp
 4. Installation of scheduled connector.
 5. Installation of C-clamp and all associated hardware, including safety cable.
 6. Software configuration and firmware updates as required.

3.2 INSTALLATION

- A. Deliver Stage Lighting Fixtures and Accessories for Owner's use and installation. Installation labor is not included in the scope of this Specification.

3.3 OPERATION AND MAINTENANCE MANUALS

- A. Upon delivery, the Manufacturer shall provide Operation and Maintenance manuals in quantity identified in Division 1, bound in hard ring binders. Minimum of three manuals shall be furnished to Owner, one bound hard copy and two electronically on portable USB drives.
1. Inventory of Stage Lighting Fixtures and Accessories delivered.
 2. Catalog cut sheets for all device types.
 3. Maintenance and care instructions and recommendations.
 4. Warranty information.

END OF SECTION 116109

SECTION 116113 – THEATRICAL DRAPERY AND TRACK

PART 1 GENERAL

1.1 WORK INCLUDED

- A. This section includes all labor, materials, equipment, and services necessary to manufacture and deliver to job site and install the stage drapery as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Velour bi-parting curtains and associated fully-rigged split traveler tracks.
 - 2. Velour leg, tab, border, and blackout curtain panels.
 - 3. Muslin cyclorama panels and associated bottom weight pipe.
 - 4. Cotton scrim and associated bottom weight pipe.
 - 5. Walk-along curtain track and hardware.
 - 6. Storage hampers.
- B. It shall be the responsibility of the Stage Drapery Manufacturer to furnish equipment complete in all respects and to provide any additional equipment required to fulfill the intent of these drawings and specifications whether or not such items are herein specified or indicated.

1.2 GENERAL

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Related work in other Sections
 - 1. Division 11: Theatrical Rigging Systems; Theatrical Pipe Grid.
- C. Site Conditions: Contractor shall be responsible for verifying that the job conditions are ready to receive work in this section. Contractor must alert the Construction Manager to any existing conditions that may adversely affect execution of work, so that resolution may be reached before commencement of installation.

1.3 SUBMITTALS

- A. Submittals shall be according to the Conditions of the Contract and Division Specification Sections.
- B. Prior to fabrication, Stage Drapery Manufacturer shall submit for review a 1/2 yard x full width minimum size sample of each color of each fabric type.
 - 1. Each sample shall be provided with labels listing Manufacturer and Manufacturer's identification numbers.
 - 2. Work shall not commence on fabrication until review of samples has been transmitted to the Stage Drapery Manufacturer.
 - 3. Submit Manufacturer's color line samples to the Specifier to verify color selections.
 - a. Dye lot to be guaranteed by Manufacturer.

4. For custom color drapery, submit Manufacturer's lab dip sample matching control sample furnished by Architect.
 - a. Lab dip dye lot to be guaranteed and maintained by Manufacturer after approval.

- C. Prior to providing shop drawings and fabrication, dimensions shall be verified by field measurements.
 1. After field measurements are taken, Stage Drapery Manufacturer shall provide information as to exact dimensions of drapery items and areas affecting drapery sizes.
 2. This information will be used to coordinate work with other trades and to verify that all drapery items have been accounted for.
 3. No extras will be allowed due to the Stage Drapery Manufacturer's misunderstanding as to the amount of work involved or lack of knowledge of any field conditions based on neglect or failure to make field measurements or thorough investigation of the job site.

- D. Shop Drawings shall be submitted for review before fabrication can begin. Such review does not relieve the Stage Drapery Manufacturer of the responsibility of providing equipment in accordance with this Specification.
 1. Shop Drawings shall show each type of curtain track plus the method and equipment to be used in hanging the curtain track.
 2. Where items must fit and coordinate with finished surfaces and/or constructed spaces, take measurements at site and not from drawings.
 3. Where welded connections or concrete or masonry inserts are required to receive work, shop drawings shall show exact locations required and all such drawings shall be furnished to the trades responsible for installing the connectors or inserts.
 4. Catalog work sheets showing illustrated cuts of items may be submitted for standard manufactured items.

- E. Furnish Operations and Maintenance manuals containing record shop drawings, operation instructions and recommended maintenance procedures for all equipment, in quantity outlined in Division 01.

1.4 WARRANTY

- A. Manufacturer agrees to make all repairs, including replacement of materials, made necessary due to defects in workmanship and materials without additional cost to the Owner for a period of two years from the date of acceptance.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Refer to Division 01 – Work-Related Requirements for transporting, handling, storing, and protecting products.
- B. Bid price shall include full freight and insurance charges for the delivery of all drapery items to the job site.
- C. If, through no fault of the Owner, the timely completion of the work of this section is imperiled, the Drapery Manufacturer shall prevent or minimize any delay by shipping the required products by airfreight, at no additional cost to the Owner.

1. This requirement covers initial delivery of fabrics to the Drapery Manufacturer, and delivery of finished drapery to the job site.
- D. Each drapery item shall be carefully wrapped and sealed tight for shipment in rigid and waterproof wrapping material to insure against impact and water damage during shipment.

1.6 MANUFACTURERS

- A. Manufacturers for work in this section shall include the following:
 1. Beck Studios, Inc – Milford, OH
 2. BellaTEX Stage Curtains – Jackson, TN
 3. iWeiss, Inc. – Fairview, NJ
 4. Rose Brand East – Secaucus, NJ
 5. Stage Decoration and Supplies – Greensboro, NC
 6. Tiffin Scenic, Tiffin, OH

1.7 INSTALLATION CONTRACTORS

- A. The Stage Drapery Contractor shall have been continuously engaged in the installation of stage drapery for at least 10 years.
- B. The Stage Drapery Contractor shall have installed a total of not less than five installations of equal or greater scope to system specified herein, manufactured and installed by the bidder.
- C. Pre-approved Stage Drapery Contractor for Work of this Section shall include:
 1. Beck Studios Inc.
1001 Tech Drive
Milford, OH 45150
Contact: Dan Ilhardt dan@beckstudios.net
513-831-6650
 2. Chicago Flyhouse
2925 W. Carroll Ave.
Chicago, IL 60612
Contact: Benjamin Cohen bcohen@flyhouse.com
773-533-1590
 3. I. Weiss
815 Fairview Avenue, Unit 10
Fairview, NJ 07022
Contact: Jennifer Tankleff JenniferT@iweiss.com
888-325-7192
 4. J.R. Clancy, Inc.
7041 Interstate Island Rd.
Syracuse, NY 13209
Contact: Mike Murphy mikemurphy@jrclancy.com
800-836-1885

5. Scenic Solutions
355 Gargrave Road
West Carrollton, OH 45449
Contact: Andrew Persson Andrew.Persson@scenicolutions.com
941-806-7798
6. Stage Rigging Services (SRS)
831 Winston Street
Greensboro, NC 27405
Contact: Les Martin lmartin@srsrigging.com
336-370-1900
7. Texas Scenic
5423 Jackwood Dr.
San Antonio, TX
Contact: Roy Harline r.harline@texasscenic.com
800-292-7490
8. Tiffin Scenic Studios
P.O. Box 39
Tiffin, OH 44883
Contact: Steve Everhart severhart@tiffinscenic.com
800-445-1546

1.8 The Contractor for this section shall be the same Contractor that furnishes and installs the following related Division 11 theatrical systems specified on this project:

- A. 11 61 23 – Theatrical Rigging
- B. 11 61 29 – Pipe Grids

PART 2 - PRODUCTS

2.1 FABRICS

- A. All fabrics shall be inherently flame retardant and shall meet all requirements of NFPA #701, Large and Small Scale.
 1. All finished goods shall be furnished by the Stage Drapery Manufacturer to the Owner with proper affidavit of flame proofing in the form acceptable to local authorities.
- B. The following fabrics are approved for drapery use:
 1. Stage legs, borders, blackouts, and acoustic drapes shall be in manufacturer standard colors to be selected by Specifier, using following fabric:
 - a. *Charisma*, 25 oz. Trevira CS, 54" wide, IFR, supplied by KM Fabrics, Greenville, SC.
 2. Muslin cyclorama shall be white Travira IFR, seamless.
 3. Scrim shall be black cotton sharktooth weave, FR, seamless.

2.3 TIE LINE, GROMMETS, WEBBING

- A. Grommets shall be #2 or #3 brass type.

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- B. Tie lines shall be #4 braided masonry line, 36" long and black in color, unless otherwise noted.
- C. Webbing shall be 3" wide, polypropylene type.

2.4 DRAPERY

- A. General:
 - 1. All velour shall be stitched with nylon thread and shall be without flaws, with each width of cloth continuous for the full height of the drapery with no horizontal seams or piercing.
- B. Velour Bi-Part Curtain Panels:
 - 1. Each panel shall be sewn with vertical seams and fullness as noted on drapery schedule.
 - 2. Sew on to webbing 12" o.c. with snap hooks attached with nylon straps and two (2) rivets per hook.
 - 3. Provide a minimum 4" turn back on offstage side edge.
 - 4. Provide a minimum 26" turn back on onstage side edge.
 - 5. Provide a 6" deep hem at the bottom with a separate, chain filled #8 canvas or nylon pocket.
- C. Velour Borders:
 - 1. Each panel shall be sewn with vertical seams and fullness as noted on drapery schedule.
 - 2. Sew fullness into the fabric using box pleats.
 - 3. On pleated drapes, vertical seams are to be hidden within the folds of the fabric.
 - 4. Sew onto webbing with grommets at 12" o.c. with tie lines attached for each.
 - 5. Provide a 4" turn back on each side edge.
 - 6. Provide a 6" deep hem at the bottom with a separate, chain filled #8 canvas or nylon pocket.
- D. Velour Legs, Tabs and Blackouts:
 - 1. Each panel shall be sewn with vertical seams and fullness pleated in as noted on drapery schedule.
 - 2. Sew fullness into the fabric using box pleats.
 - 3. On pleated drapes, vertical seams are to be hidden within the folds of the fabric.
 - 4. Sew onto webbing with grommets at 12" o.c. with tie lines attached for each.
 - 5. In addition to tie lines, sew on to webbing 12" o.c. with snap hooks attached with nylon straps and two (2) rivets per hook.
 - 6. Provide a 4" turn back on each side of legs.
 - 7. Provide a 6" deep hem at the bottom with a separate, chain filled #8 canvas or nylon pocket.
- E. Sharkstooth Scrim:
 - 1. Scrim shall be made up of seamless sharkstooth scrim material in color noted on drapery schedule.
 - 2. Sew scrim onto webbing at the top and face the scrim with a piece of 3" wide #8 canvas sewn through the scrim to the webbing with grommets at 12" o.c., furnished with tie lines.

3. Scrim to have a 6" bottom hem which acts as a "flap" to mask pipe and chain pockets.
4. Provide a 4" #8 canvas or nylon pocket for 1/2" pipe sewn onto the back of the scrim at the bottom. Provide reinforced openings in pocket at 10' centers for optional partial piping.
6. At each side of the scrim, provide a 4" reinforced turn back hem.

F. Cyclorama Panels:

1. Cyclorama shall be sewn from IFR muslin, 128" width, dyed to CBS gray color.
2. Sew onto webbing at the top with double layer hemmed fabric, with grommets at 12" o.c., furnished with white tie lines.
3. Cyc panel to have a 6" hem which acts as a "flap" to mask pipe and chain pockets.
4. Provide a 4" #8 canvas or nylon pocket for 1/2" pipe sewn onto the back of the bottom hem. Provide reinforced openings in pocket at 10' centers for optional partial piping.
5. At each side of the cyc panel, provide a 4" reinforced turn back hem.

2.5 DRAPERY SCHEDULES

- A. Refer to drawings for drapery panel schedule indicating quantity, width, height, and type.
- B. Drapery Manufacturer shall field verify all dimensions prior to fabrication. Any errors in finished size due to failure to properly verify field conditions will result in re-manufacture of any draperies not in compliance, at sole expense of the Manufacturer.
- C. Labeling of each drapery panel shall be by means of a cotton or synthetic duck tag sewn securely to the webbing at top right hand corner of each finished piece. Each tag shall contain the following, marked using indelible black ink:
 1. Type of panel (ex: Leg, Traveler #1 S.R., etc.)
 2. Panel dimensions (ex: 8'-0"w x 24'-0"h)
 3. Material type and weight (ex: 25oz IFR Velour)
- D. Border, Scrim, and Cyclorama panels shall have the panel center line indelibly marked on the top rear webbing, and shall have a contrasting color center tie line.

2.6 CURTAIN TRACKS

- A. Bi-Parting Traveler Drapery Curtain Tracks:
 1. Furnish and install all hardware required for cord operated ADC #282 or H&H #416S curtain track system in lengths and locations as shown on the drawings.
 - a. Track shall be furnished in minimum 14 gauge galvanized steel construction.
 - b. Equip with backpack/rear fold devices for offstage curtain gathering.
 2. System shall be suspended from structure or pipe battens as indicated on drawings, in a manner that permits adjustment of height as well as simple re-positioning of the system when required for various productions.
 3. Track shall be in a continuous straight length, with minimum number of segments joined to complete the lengths indicated.

4. Support tracks from suspended pipe battens or from building structure at manufacturers recommend spacing as required. Additional supports required within 1' of the end of any track.
 5. System shall be furnished complete with all necessary accessories (CWANA), including hanging clamps, track splices, master carriers, single carriers, rubber bumpers, center pipe supports, back-pack guides, and end stops for all tracks.
 - a. Furnish adequate carriers to serve number of drapery grommets indicated for drapery scheduled for each track system, plus 10% spare carriers
- A. Walk Along Curtain Tracks:
1. Furnish and install all hardware required for walk along ADC #143 or H&H #301W curtain track system in lengths and locations as shown on the drawings.
 2. Where tracks are suspended, as indicated on drawings, they shall be hung in a manner that permits adjustment of height as well as simple re-positioning of the system when required for various productions.
 3. Track shall be in a continuous straight length, with minimum number of segments joined to complete the lengths indicated. Provide curves as shown on drawings.
 4. Support tracks from suspended pipe battens or from building structure at manufacturers recommend spacing as required. Additional supports required at each track bend, switch location, and within 1' of the end of any track.
 5. System shall be furnished complete with all necessary accessories (CWANA), including factory curves (trim to adjust as required), hanging clamps, track splices, master carriers, single carriers, rubber bumpers, and end stops for all tracks.
 - a. Furnish adequate carriers to serve number of drapery grommets indicated for drapery scheduled for each track system, plus 10% spare carriers
 6. Furnish track switchers in quantity and orientation indicated on drawings. Switchers shall be configured for rope and pole operation options, to permit Owner to choose method of use.
 - a. Furnish one operating pole for each switcher.
- B. Verify all track lengths in the field before fabrication.

2.7 ACCESSORIES

- A. Furnish 1/2" NPS schedule 40 steel pipe or 3/4" IMT conduit, threaded and coupled, for use as curtain panel bottom stretcher.
1. Provide enough 10' lengths of bottom pipe for all items listed in the schedules as having a pipe pocket.
 2. Provide six additional 10'-0" lengths, and four 5'-0" lengths.
 2. Provide one end cap and one pipe coupler for each pipe segment, to protect fabric during insertion of pipe and to permit joining of segments.
- B. Furnish five 16-bushel rolling storage hampers with canvas liner and plywood hinged lid, for storage of stage drapery when not in use.
1. Liner shall be heavy duck canvas, plain white color, sewn onto frame with top reinforcement. Fabric loop handles shall be sewn at each end of liner.
 2. Hamper frame shall be spring steel, welded to bottom plate steel.
 3. Chassis shall be hardwood runners with caster boards.
 4. Casters shall be 4" diameter swiveling with rubber or phenolic treads.

5. Basis-of-Design Manufacturer: Dandux by C. R. Daniels Inc.

PART 3 EXECUTION

3.1 GENERAL

- A. Examine all conditions under which all items in the section shall be installed and notify the Construction Manager in writing of any condition detrimental to the proper and timely completion of the installation.
- B. Responsibility for the satisfactory completion of the work in this section shall rest solely and exclusively with the Stage Drapery Manufacturer.
- C. Field verify condition of delivered goods, and repair or replace any components not in factory new condition. All materials shall remain covered or protected from debris, dust, paint, and other site hazards throughout the period between delivery to site and Owner training.
- D. Manufacturer shall be responsible for repairing any damage to jobsite surroundings during installation.
- E. Installation and training shall be supervised by the Stage Drapery Manufacturer's experienced supervisor, who shall have extensive installation experience with systems similar to those specified herein. This same supervisor shall remain in charge throughout the entire installation and training process, with exception only for circumstances completely beyond the control of the Manufacturer.
- F. All components shall be installed plumb, straight, and true, and shall function as designed. Anchors, connecting members, brackets, and associated fastening means and methods for properly supporting and bracing equipment shall be furnished and installed following best suitable practice for each condition.
- G. Prior to the completion of the installation, the Stage Drapery Manufacturer shall notify the Construction Manager to arrange on a date for inspection of the system.
 - 1. At the time of the inspection, the Stage Drapery Manufacturer shall furnish sufficient personnel to operate all equipment and to perform adjustments and tests as may be required by the Owner's representatives.
 - 2. Any equipment that fails to meet with the Specifications shall be repaired or replaced with new equipment, and the inspection shall be re-scheduled under the same conditions listed previously.
 - 3. Final review will be withheld until all systems have been thoroughly tested and found to be in first class operating condition in every circumstance.

3.2 OWNER TRAINING

- A. Manufacturer's installation Supervisor shall perform up to four hours of Owner training to the Owner's representatives.
- B. Training shall include:
 - 1. Operation of curtain tracks and switchers.

2. Installation, dismantling, and storage of draperies.
 3. Care and maintenance.
 4. Warranty review.
- C. Class size is limited to six participants/crew and shall include at minimum:
1. Technical Director
 2. Scene Shop Supervisor
- D. Contractor shall schedule instruction with the Owner's designated representatives.
- E. Instruction shall be independent of the system check-out and activation. Length of engineering check-out and activation shall not affect the length of instruction time.
- F. Written documentation of Owner training shall be provided to the Owner upon completion.
1. Form to include:
 - a. The date, time, and location of training.
 - b. Name, title, company and signature of trainer.
 - c. Name, title, and signature of all participants.
 - d. Topics covered at training.
 2. If training is non-continuous, provide one form for each training segment.
- G. Training may be video and audio recorded by the owner at the owner's expense.

END OF SECTION 116113

SECTION 116123 – THEATRICAL RIGGING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK OF THIS SECTION

- A. This Section includes all labor, materials, equipment, and services necessary to furnish and install the Stage Rigging System as shown on the drawings and/or specified herein, including but not limited to the following:
 - 1. Rigging of stage lighting system multicables.
 - 2. Seven variable speed motorized package hoists.
 - 3. Emergency stops.
 - 4. One automated rigging controller with remote.
 - 5. One push-button rigging controller.
 - 6. 16 dead-hung pipe battens.
 - 7. Fixed lighting pipes.
 - 8. Pin rails.
 - 9. Miscellaneous equipment listed herein and on schedules, for installation by others.
 - 10. Mule blocks, idler sheaves, cable rollers or guides as required assuring proper alignment and operation of the rigging system.
- B. It shall be the responsibility of the Stage Rigging Contractor to furnish equipment complete in all respects and to provide any additional equipment required to fulfill the intent of these drawings and specifications whether or not such items are herein specified or indicated.

1.3 PROJECT CONDITIONS

- A. All dimensions shall be verified in the field prior to fabrication by the Stage Rigging Contractor, who shall make at least one visit to the job site prior to preparation of shop drawings.
- B. No extras will be allowed due to the Stage Rigging Contractor's misunderstanding of the work involved or its lack of knowledge of any field conditions due to failure to make accurate field measurements or a thorough investigation of the job site.

1.4 SUBMITTALS

- A. Stage Rigging Contractor shall prepare and submit complete shop drawings according to the requirements set forth in the Contract Documents.

- B. Shop Drawings shall be submitted for review by the Architect before fabrication can begin. Such review does not relieve the Stage Rigging Contractor of the responsibility of providing equipment in accordance with this Specification.
- C. Shop Drawings:
1. Shop Drawings shall show dimensions, sizes, gauges, thicknesses, finishes, joining, attachments and relationship of work to adjoining construction.
 2. Shop drawings shall clearly show power, wire, and conduit requirements for all work to be provided by the Stage Rigging Contractor.
 3. Where items must fit and coordinate with finished surfaces and/or constructed spaces, take measurements at site and not from drawings.
 4. Where other materials must be set to exact locations to receive rigging, furnish assistance and directions necessary to permit other trades to locate their work.
 5. Where welded connections, concrete or masonry inserts are required to receive work, shop drawings shall show exact locations required and all such drawings shall be furnished to the trades responsible for installing the connectors or inserts.
 6. Show locations of all lubrication points.
 7. Shop drawings for motorized equipment shall include engineering and load calculations as well as stamp and seal of a registered professional engineer.
 8. Catalog work sheets showing illustrated cuts of items may be submitted for standard manufactured items.
 9. Shop drawings shall include a copy of the installation superintendent's ETCP Certified Rigger - Theatre certification. A copy of the installation superintendent's ETCP certification shall be available on the job site for the length of the installation.
- D. Any deviation from this Specification shall be "starred" and noted in letters a minimum 1/4" high.
1. For a deviation to be considered, it must upgrade the quality of the equipment or respond to a field condition.
- E. The Stage Rigging Contractor shall, if requested by the Owner or Architect, furnish satisfactory evidence as to the kind and quality of materials he proposes to furnish by submission of exact samples of hardware to be used in this contract.
1. The samples shall be retained by the Owner until such time that this contract has been completed and accepted.
- F. Upon completion of installation, Stage Rigging Contractor shall provide Operation and Maintenance manuals that shall include record shop drawings, parts lists, operational instruction, service/maintenance recommendations, component working load limits, etc.
1. One O&M manual shall be a printed hard copy.
 2. O&M manual shall also be provided in electronic format on two flash drives.
- G. Rigging System Log Book:
1. At Owner training, furnish a system log book, configured to permit Owner tracking of inspections, system issues and maintenance history. Provide overview of observations and actions that should be documented for appropriate record keeping and compliance with industry standards for safety. Log book shall include:
 - a. Schedule and ID of all installed rigging sets (manual and motorized).
 - b. Identification of design parameters for each set, including high and low trim limits, set live loading capacity, hoist configuration settings, etc.

- c. Log sheet for periodic system-wide inspections, including commissioning date of system as first entry.
- d. Journal fields for each set to document date, status, observations, actions taken, and resolution.

1.5 WARRANTY

- A. The Stage Rigging Contractor shall assure that the rigging is properly installed, free of defects in materials and workmanship and shall provide a warranty on all equipment and workmanship provided under this contract for a period of two years from the date of the final acceptance.
- B. During the warranty period, repair or replacement of defective materials and faulty workmanship shall be provided, at no cost to the Owner, within 10 days of written notification of defects(s).
- C. Post Installation Safety Inspection:
 - 1. One year after the date of final acceptance by the Owner, the Stage Rigging Contractor Supervisor shall return to the job site to conduct a thorough inspection of the rigging installation.
 - a. All bolts shall be checked and tightened as required, cables and all cable connections inspected, and all items given a thorough safety inspection in compliance with ANSI E1.47, Entertainment Technology – Recommended Guidelines for Entertainment Rigging System Inspections.
 - b. All damage not caused by negligence on the part of the Owner shall be repaired and/or damaged components replaced.
 - c. If the original supervisor is unavailable either because the supervisor no longer works for the contractor or due to issues fully beyond the control of the contractor, then an alternate rigger superintendent shall perform the inspection, under the following conditions:
 - 1) The alternate superintendent shall be ETCP-RT certified.
 - 2) The alternate superintendent shall have experience supervising installation on projects of similar scope and scale.
 - 2. All materials, superintendent labor, transportation and living expenses for this work shall be furnished by the Stage Rigging Contractor at no additional cost to the Owner.
 - a. The inspection and repair work shall be conducted during normal working hours at a time mutually agreed upon by the Owner and the Stage Rigging Contractor.
 - 3. Within two weeks of the completion of the inspection, the Stage Rigging Contractor shall provide the Owner and Architect with a written report stating the findings of the inspection.

1.6 STAGE RIGGING MANUFACTURERS / STAGE RIGGING CONTRACTORS

- A. The Stage Rigging Contractor shall have been continuously engaged in the production of theatrical stage rigging equipment for at least 15 years.
- B. The Stage Rigging Contractor shall have installed a total of not less than five installations of equal or greater scope to system specified herein, which have been in service for a minimum of one year and a maximum of 10 years.

1. Each of the listed stage rigging installations shall be in service in fully professional commercial theatres being operated by professional technicians.
- C. Stage Rigging Manufacturers for work of this section shall include:
1. Electronic Theatre Controls (ETC)
3031 Pleasant View Rd.
Middleton, WI 53562
Contact: Gary Henley gary.henley@etconnect.com
800-688-4116
 2. J.R. Clancy, Inc.
7041 Interstate Island Rd.
Syracuse, NY 13209
Contact: Mike Murphy mikemurphy@jrclancy.com
800-836-1885
- D. Stage Rigging Contractors for work of this section shall include:
1. Integrated Theater Systems
117 Roup Avenue
Pittsburgh, PA 15206
(412) 441 8000
 2. Vincent Lighting
920 Vista Park Dr.
Pittsburgh, PA 15205
(412) 788-5250
 3. Chicago Flyhouse
2925 W. Carroll Ave.
Chicago, IL 60612
773-533-1590
 4. J.R. Clancy, Inc.
7041 Interstate Island Rd.
Syracuse, NY 13209
800-836-1885
 5. Stage Rigging Services (SRS)
831 Winston Street
Greensboro, NC 27405
336-370-1900
 6. Texas Scenic
611 Lofstrand Ln #A
Rockville, MD 20850
(301) 874-1747

7. 4Wall Entertainment
9525 Berger Rd,
Columbia, MD 21046
(410) 242-3322
8. Barbizon Lighting
6437 General Green Way #2413
Alexandria, VA 22312
(703) 750-3900

- E. The Contractor for this section shall be the same Contractor that furnishes and installs the following related Division 11 theatrical systems specified on this project:
1. 11 61 13 – Theatrical Drapery and Track
 2. 11 61 29 – Pipe Grids and Fixed Lighting Pipes

PART 2 PRODUCTS

2.1 MATERIALS

- A. Ferrous materials and accessories shall conform to the following ASTM and ANSI standard specifications:
1. Standard structural steel shapes and plates: ASTM A-36.
 2. Miscellaneous steel items: ASTM A-283, grade optional.
 3. Steel pipe: ASTM A-120
 4. Gray iron castings: ASTM A-48, Class 30 unless otherwise specified.
 5. Malleable iron castings: ASTM A-47
 6. Bolts and nuts: B18.2.1&2
 7. Welding electrodes shall be as permitted by AWS Code D1.0.
- B. Wire Rope and Fittings
1. Wire rope shall be 7x19 construction, utility cable, sized as required, that meets Federal Specification RR-W-410E.
 - a. Damaged or deformed cables shall not be used.
 2. Cable fittings shall be Nicopress copper sleeves or forged steel clips and conform to wire rope manufacturer's recommendations as to size, number and method of installation.
- C. Aluminum Materials and Accessories
1. Thicknesses, gauges and tempers of aluminum products shall be as required for proper forming operations and to meet structural standards.
 2. Aluminum Castings: 214 or 356 alloy as per strength requirements.
 3. Fasteners: Include bolts, nuts, washers, screws, nails, rivets and other fastenings necessary for proper erection and/or assembly of aluminum work.
 4. Fabrication shall be by AWS certified welders.

- D. Finishes for Items Without Factory Finish
1. Welds, burrs, and rough surfaces on all interior ferrous metals shall be ground smooth and the completed assembly cleaned, and all metal surfaces shall be given a minimum one coat of finish paint.
 2. No painted finish is required on aluminum finishes.
 3. All exposed fastenings shall match color and finish of adjacent material.

2.2 SAFETY STANDARDS

- A. To establish minimum standards of safety, the following factors shall be used:
1. Cables and fittings: 8:1 Safety Factor
 2. Terminating hardware: 5:1, or not exceeding WLL, whichever is more restrictive.
 3. Trim chain assembly: 5:1, or not exceeding WLL, whichever is more restrictive.
 4. Batten clamps: 5:1, or not exceeding WLL, whichever is more restrictive.
 5. Motors: 1.0 Service factor
 6. Gearboxes: 1.25 Mechanical Strength Service Factor
 7. Cable bending ratio: Sheave diameter is 30 times diameter of cable
 8. Tread pressures: 500# for cast iron, 900# for Nylatron, 1000# for steel
 9. Maximum fleet angle: 1-1/2 degrees
 10. Steel: 1/5 of yield
 11. Bearings: L10 life of 2000 hours at two times required load at full speed
 12. Bolts: Grade 5 or better, plated

2.3 SIGNAGE

- A. Provide and install signs with white background and 3/8" high red letters to be mounted on the wall on the stage level, fly gallery level, and loading bridge level at a position that is conspicuous to workers performing rigging work.
1. The signs shall read as shown on the drawings.
 2. "Date of Last Inspection" and "Date of Next Required Inspection" information shall be in erasable marker.

2.4 VARIABLE SPEED MOTORIZED LINESETS

- A. Provide four motorized, 1,200# capacity linesets, each with variable speed motorized winch, head blocks, loft blocks, 7x19 pickup cables, and pipe batten as shown on the drawings.
1. Manufacturer shall be responsible for steel, hardware, etc. required to provide means of attachment of the motorized linesets to building structure.
- B. Provide three motorized, 1,800# capacity linesets, each with fixed speed motorized winch, head blocks, loft blocks, 7x19 pickup cables, and pipe batten as shown on the drawings.
1. Manufacturer shall be responsible for steel, hardware, etc. required to provide means of attachment of the motorized linesets to building structure.
- C. Each motorized set shall be U.L. approved and include the following:
1. Electric motor with gearbox, starter and brake-motor.
 - a. The motor shall be 480-volt type and have a minimum AGMA service factor for 1.0 for continuous operation and the gearing service factor shall be a minimum of 1.0 with a mechanical strength factor of 1.3.

- b. Motor shall have ramp up/down providing "soft start" and "soft stop" capability to lessen impact load when motor starts and stops
 2. The variable hoist lifting speed shall be variable from 0' to 120' per minute.
 3. Provide minimum 5 mechanical limit switches including over travel high, high, low and over travel low.
 4. Linesets shall have overload sensors on each lift cable.
 5. Linesets shall have slack line detection sensors on each lift cable.
- D. Head blocks:
1. Each head block shall be underhung, multi-sheave type and have at least six pipe spacers, through bolted to the side plates, to prevent cables escaping from the sheave grooves.
 2. The 12" diameter cast or nylon sheaves shall be machined, faced, lathe turned and grooved for the liftline cable.
 - a. Grooves shall conform to cable manufacturer's recommendations.
 3. The sheaves shall operate on a 1" diameter steel shaft mounted in tapered roller bearings with felt seals press fitted in the head block bore.
 - a. The head block shaft shall be keyed to one side plate or otherwise restrained to prevent rotation.
 - b. Proper adjustment of the bearings to be accomplished by "Flexloc" self-locking nut on the opposite side of the shaft.
 4. Side plates shall be fabricated of not less than 10-gauge steel and each side plate shall be welded to the base angle.
 5. Each head block shall be furnished with support angle irons, sized to support the specified loads.
 - a. Provide a minimum of two bolts per base angle, sized for the specific load, or mounting clips of sufficient size.
 6. When completely installed, each head block shall be aligned so that each sheave, its center and sides, remain in the same vertical axis when the sheave is rotated.
- E. Loft blocks:
1. Loft blocks shall be underhung and shall have an 8" diameter nylon sheave with a hub of at least 2" in diameter.
 2. Sheaves shall have a lathe turned cable groove of required size plus 1/64" clearance.
 - a. The sheaves shall be machined, faced and bored for shaft and bearings.
 3. Each loft block sheave shall contain two tapered roller bearing assemblies operating on a 1/2" diameter steel shaft or sealed precision ball bearings on a 5/8" diameter steel shaft.
 - a. The head of the shaft to be keyed to one side plate and the opposite end of the shaft shall be threaded and equipped with "Flexloc" self-locking nut to prevent shaft from rotating.
 - b. Side plates shall be a minimum of 11-gauge steel.
- F. Mule blocks:
1. The component parts of all mule blocks shall meet the same specifications as the head blocks, except that sheave shall be 10" in diameter, provided with suitable universal joint swivel bases and mounting stands or bracket to meet the job conditions.
- G. Idler blocks:
1. Idler blocks shall consist of one or more sheaves contained within an assembly to provide only vertical support of the lift lines.
 2. Idler blocks shall be mounted to loft blocks or from building structure.

H. Pipe Battens:

1. Single pipe battens shall be constructed of 1-1/2" NPS, schedule 40 steel pipe.
2. All joints shall be sleeve spliced with 18" long sleeves, 9" extending into each pipe. The pipe sections of each set shall be bolted through the sleeve with two 3/8" x 1" hex head, grade 5 bolts. Holes shall be drilled in pipes and sleeves so that all pipe sections are interchangeable.
3. Battens shall be painted black. The last 12" at each end of the truss and pipe batten shall be painted white or shall have yellow plastic end caps.
4. Each batten shall have its centerline marked with a 1/2" painted yellow line around the circumference of the bottom pipe.
5. Each batten shall have 1' increments marked around the circumference of the batten, starting at center and working out to the ends, with 1/2" wide, white painted lines.
6. At each liftline point, provide a red tape mark on each side of the trim chain for the full circumference of the top pipe.
7. Each batten shall have its line set number in 1" high white numerals on the top and bottom of each batten 18" from each end, and 12" stage left of the centerline mark.
8. Liftline batten connections shall be trim chains.

I. Liftline Cables:

1. All liftline cables shall be 7 x 19 utility cable and shall be free of oil. Certification will be required.

J. Trim Chains:

1. Trim chain shall be either J.R. Clancy Grade 63 *AlphaChain* or SECOA *STC* chain, with 3,250# working load and meeting OSHA 1910.184(e)(5) – Sling use, 36" long, and used at the batten end of the pickup cables.
2. One end of the trim chain shall connect to liftline with thimbles and Nicopress sleeves.
3. The other end of the trim chain shall be fitted with a 1/4" screw-pin shackle.

2.5 VARIABLE-SPEED AND FIXED-SPEED STAGE RIGGING CONTROL PANEL:

A. General:

1. The controller shall be wall mounted at a height to provide ADA mandated accessibility.
2. Controller shall have remote control pendant with 30'-0" cable and plug in locations at stage left and stage right.

B. Control Interface:

1. An operator control panel shall be provided that features "Go Up", "Go Down", and "Go Target" pushbuttons and a Joystick for dynamic override of pre-programmed speeds.
2. Dual Playback Controls
 - a. Two separate GO buttons and a joystick. Any system that does not allow dynamic change of recorded hoist speed is not acceptable.
3. Show data shall be backed up automatically at regular intervals, and by user command to a solid-state flash drive system.
4. Five modes of operation shall be supported:
 - a. Direct Operation - One or more sets can be selected and operated manually
 - b. Single Target - One or more sets may be selected and sent to a common target height
 - c. Multiple Targets – Multiple sets may be selected and sent to differing target heights

- d. Relative Target - One or more sets can be selected and sent to specific distances from their present positions.
 - e. Current Position as Target – One or more sets may be moved, then returned to their starting positions. For example, a stage electric might be lowered to change gels, then accurately returned to its previous position.
- C. Recorded Cues and Presets:
1. An operator recording cues and presets may specify:
 - a. Target position – a specific target position, a relative move (e.g. go out 10'), or a match to a present or previous position.
 - b. Acceleration – a set specific rate or a default value
 - c. Speed - a velocity, a percentage of full speed, or a travel time. Default values also supported.
 - d. Deceleration - A set specific rate or a default value
 - e. Number of hoists controlled – each with its own speed and target
 - f. Synchronized Groups
 - g. Cue and preset names and labeling
- D. Safety Requirements:
1. For safety, movement may be initiated only by hold to run (dead man) hardware pushbuttons or joysticks.
 2. A console-controlled limit function shall allow the operator to set “soft” upper, lower and preset limits for each encoder-equipped hoist.
 3. Where the load monitoring option is specified, the control system shall be capable of “learning” the load characteristics and monitoring load changes. The load monitoring system shall accommodate change to the suspended weight of electric cables and other predictable variables, without false tripping.
 4. The system shall include password-protected for “Access”, “Edit” and “System” levels of operation at a minimum. Additional user levels shall be password-protected and created as directed by Owner.
 5. Height and distance data may be entered as feet and inches, decimal feet, or metric units as directed by the Owner.
 6. A mushroom head "EMERGENCY STOP" button wired to a failsafe circuit that conforms to NPFA 79 requirements shall be provided.
 7. An "ON/OFF" key operated switch shall be provided that removes power to the console, motor starters and drives. Any control system that requires motors and drives energized while the system is not in use is not acceptable.
- E. Remote Hand-Held Pendant Controller w/ E-Stop:
1. Provide one remote motorized winch line set controller that allows separate control of the line sets and contains the same programming modules as the Main Controller.
 2. Pendant shall have an E-stop that meets the requirements above.
 3. Provide Pendant Controller with 30'-0" of control cable.
 4. Pendant controller shall connect into the main controller and remote-control receptacles.
- 2.6 FIXED, DEAD-HUNG, PIPE BATTENS
- A. Provide 16 fixed, dead-hung pipe battens and 7x19 pickup cables as shown on the drawings.

- B. Manufacturer shall be responsible for steel, hardware, etc. required to provide means of attachment of the fixed battens to building structure.

2.7 FIXED LIGHTING PIPES

- A. Provide fixed lighting pipes in the proscenium theater as shown on the drawings at the following locations:
 - 1. House left near and far box booms
 - 2. House right near and far box booms
 - 3. Front wall of control room
- B. Manufacturer shall be responsible for steel, hardware, etc. required to provide means of attachment of the fixed lighting pipes to building structure.
- C. Coordinate with structural and architectural finishes.

PART 3 - EXECUTION

3.1 GENERAL

- A. Examine all conditions under which all theatrical rigging items shall be installed and notify the Construction Manager in writing of any condition detrimental to the proper and timely completion of the work.
- B. Responsibility for the satisfactory completion of this rigging system shall rest solely and exclusively with the Stage Rigging Contractor.
- C. The Stage Rigging Contractor shall supply all tools required for the successful installation of the equipment herein.
- D. The Stage Rigging Contractor shall be responsible for storage of all equipment and tools during the period of installation and shall be responsible for collecting and removing from the job site all packing materials, trash, scrap materials, etc.
- E. The Stage Rigging Contractor shall be responsible for the protection of equipment and/or finished materials provided by other Contractors.
- F. Prior to the completion of the installation, the Stage Rigging Contractor shall notify the Construction Manager and Architect to schedule an inspection of the system.
 - 1. At the time of the inspection, the Stage Rigging Contractor shall furnish sufficient personnel to operate all equipment and to perform adjustments and tests as may be required by the Architect and/or the Owner's representatives.
 - 2. Any equipment that fails to meet with the Specifications shall be repaired or replaced with new equipment, and the inspection shall be re-scheduled under the same conditions listed previously.
 - 3. All temporary equipment shall be removed to permit full operation and access to all equipment.
 - 4. Final acceptance will be withheld until all systems have been thoroughly tested and found to be in first class operating condition in every circumstance.

- G. The Stage Rigging Contractor's installation Supervisor shall provide up to 12 hours of instruction. Up to eight hours of instruction shall cover the safe and proper operation of the equipment, including limit switch placement and adjustment, use of the control panel, etc., to the Owner's designated representative. An additional four hours of training for up to six users shall be dedicated to demonstrating an ANSI inspection of one lineset of each type. ANSI inspection training shall cover what to look and listen for, how to identify common problems in each rigging system, and when a problem needs to be addressed immediately by a professional rigger.
1. Stage Rigging Contractor shall schedule instruction with the Owner's designated representatives.
 2. Instruction shall not necessarily follow immediately after the system check-out and activation.
 3. Instruction shall be independent of the system check-out and activation. Length of engineering check-out and activation shall not affect the length of instruction time.
 4. Instruction, at Owner's discretion, may occur in multiple time blocks.
 5. Written documentation of Owner training shall be provided to the Owner upon completion.
 - a. Form to include:
 - 1) The date, time, and location of training.
 - 2) Name, title, company and signature of trainer.
 - 3) Name, title, and signature of all participants.
 - 4) Topics covered at training.
 - b. If training is non-continuous, provide one form for each training segment.
 6. Training may be video and audio recorded by the owner at the owner's expense.

3.2 INSTALLATION SUPERVISION

- A. Installation of the rigging systems shall be supervised by the Rigging System Contractor's own experienced superintendent having extensive experience in installing work of this kind.
1. Superintendent shall be an Entertainment Technician Certification Program (ETCP) Certified Rigger - Theatre.
 - a. Rigging System Contractor shall provide the Architect with a copy of the superintendent's ETCP certification and shall make a copy of this certification available on the job site for the length of the installation.
 2. An ETCP Certified Rigger - Theatre shall be present at all times during the rigging system installation.
- B. The same individual shall remain in charge of the work throughout the installation of the rigging system until work is completed excepting only the intervention of circumstances completely beyond the control of the Stage Rigging Contractor.
- C. The superintendent shall represent the Rigging System Contractor and all directions given to him shall be binding as if given to the Rigging System Contractor.
1. The Rigging System Contractor may require the Owner to confirm such directions in writing.

3.3 FIELD QUALITY CONTROL

- A. Rigging System shall be installed in accordance with OSHA Safety and Health Standards and all local codes. All welding shall be in full compliance with the most recent edition of the Structural Welding Code (ANSI / AWS D1.1).
- B. All equipment shall be installed in locations shown on Construction Drawings and shall be installed plumb, straight and true, and shall function as designed.
- C. All components shall be installed to prevent abrasion of moving items against any part of the building structure or other equipment.
 - 1. Sheaves shall be so aligned as to provide fleet angles of the cables not exceeding two degrees.
 - 2. Provide mule blocks, cable rollers, and guides as required to provide proper alignment and movement around obstructions.
- D. Eyes at cable terminations shall be formed over thimbles of correct size.
- E. The Stage Rigging Contractor shall perform all drilling and fitting required in the setting of materials and all cutting and fitting required in the fitting of materials to the adjoining work of other Contractors.

END OF SECTION 116123

SECTION 116129 – PIPE GRID

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK OF THIS SECTION

- A. This Section includes all labor, materials, equipment, and services necessary to furnish and install the Pipe Grid Multi-Purpose Room as shown on the drawings and/or specified herein, including:
 - 1. Multi-Purpose Room Pipe Grid
- B. It shall be the responsibility of the Stage Rigging Contractor to furnish equipment complete in all respects and to provide any additional equipment required to fulfill the intent of these drawings and specifications whether or not such items are herein specified or indicated.

1.3 PROJECT CONDITIONS

- A. All dimensions shall be verified in the field prior to fabrication by the Contractor, who shall make at least one visit to the job site prior to preparation of shop drawings.
- B. No extras will be allowed due to the Contractor's misunderstanding of the work involved or its lack of knowledge of any field conditions due to failure to make accurate field measurements or a thorough investigation of the job site.

1.4 SUBMITTALS

- A. Contractor shall prepare and submit complete shop drawings according to the requirements set forth in the Contract Documents.
- B. Shop Drawings shall be submitted for review by the Architect before fabrication can begin. Such review does not relieve the Contractor of the responsibility of providing equipment in accordance with this Specification.
- C. Shop Drawings:
 - 1. Shop Drawings shall show dimensions, sizes, gauges, thicknesses, finishes, joining, attachments and relationship of work to adjoining construction.
 - 2. Where items must fit and coordinate with finished surfaces and/or constructed spaces, take measurements at site and not from drawings.
 - 3. Where other materials must be set to exact locations to receive pipe grid, furnish assistance and directions necessary to permit other trades to locate their work.
 - 4. Where welded connections, concrete or masonry inserts are required to receive work, shop drawings shall show exact locations required.

5. Catalog work sheets showing illustrated cuts of items may be submitted for standard manufactured items.
- D. The Contractor shall, if requested by the Owner or Architect, furnish satisfactory evidence as to the kind and quality of materials he proposes to furnish by submission of exact samples of hardware to be used in this contract.
- E. Upon completion of installation, Stage Rigging Contractor shall provide Operation and Maintenance manuals that shall include record shop drawings, parts lists, operational instruction, service/maintenance recommendations, component working load limits, etc. One O&M manual shall be a printed hard copy O&M manual shall also be provided in electronic format on two flash drives.

1.5 WARRANTY

- A. The Contractor shall assure that the pipe grid is properly installed, free of defects in materials and workmanship and shall provide a warranty on all equipment and workmanship provided under this contract for a period of two years from the date of the final acceptance.

1.6 CONTRACTORS

- A. The Contractor shall have been continuously engaged in the installation of theatrical stage rigging equipment for at least 10 years.
- B. The Contractor shall have installed a total of not less than five installations of equal or greater scope to system specified herein, manufactured and installed by the bidder.
- C. Pre-approved Contractors for Work of this Section shall include:
 1. Integrated Theater Systems
117 Roup Avenue
Pittsburgh, PA 15206
(412) 441 8000
 2. Vincent Lighting
920 Vista Park Dr.
Pittsburgh, PA 15205
(412) 788-5250
 3. Chicago Flyhouse
2925 W. Carroll Ave.
Chicago, IL 60612
773-533-1590
 4. J.R. Clancy, Inc.
7041 Interstate Island Rd.
Syracuse, NY 13209
800-836-1885

5. Stage Rigging Services (SRS)
831 Winston Street
Greensboro, NC 27405
336-370-1900
6. Texas Scenic
611 Lofstrand Ln #A
Rockville, MD 20850
(301) 874-1747
7. 4Wall Entertainment
9525 Berger Rd,
Columbia, MD 21046
(410) 242-3322
8. Barbizon Lighting
6437 General Green Way #2413
Alexandria, VA 22312
(703) 750-3900

- D. The Contractor for this section shall be the same Contractor that furnishes and installs the following related Division 11 theatrical systems specified on this project:
1. 11 61 13 – Theatrical Drapery and Track
 2. 11 61 23 – Theatrical Rigging

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Ferrous materials and accessories shall conform to the following ASTM and ANSI standard specifications:
- | | |
|--|---|
| Standard structural steel shapes and plates: | ASTM A-36. |
| Miscellaneous steel items: | ASTM A-283, grade optional. |
| Steel pipe: | ASTM A-120 |
| Gray iron castings: | ASTM A-48, Class 30 unless otherwise specified. |
| Malleable iron castings: | ASTM A-47 |
| Bolts and nuts: | B18.2.1&2 |
- Welding electrodes shall be as permitted by AWS Code D1.0.
- B. Aluminum Materials and Accessories
Thicknesses, gauges and tempers of aluminum products shall be as required for proper forming operations and to meet structural standards.
Aluminum Castings: 214 or 356 alloy as per strength requirements.
Fasteners: Include bolts, nuts, washers, screws, nails, rivets and other fastenings necessary for proper erection and/or assembly of aluminum work.
Fabrication shall be by AWS certified welders.

- C. Finishes for Items Without Factory Finish
Welds, burrs and rough surfaces on all interior ferrous metals shall be ground smooth and the completed assembly cleaned and all metal surfaces given a minimum one coat of finish paint.
All exposed fastenings shall match color and finish of adjacent material.

2.2 SAFETY STANDARDS

- A. To establish minimum standards of safety, the following factors shall be used:
Cables and fittings 8:1 Safety Factor
Terminating hardware: 5:1, or not exceeding WLL, whichever is more restrictive.
Steel 1/5 of yield
Bolts Grade 5 or better, plated

2.3 PIPE GRID

- A. Pipe grid shall be constructed of 1-1/2" NPS schedule 40 steel pipe as shown on the drawings.
- B. Pipes and all mounting hardware shall be painted black.
- C. All joints shall be sleeve spliced with 18" long sleeves with 9" extending into each pipe and held by two hex bolts and lock nuts on each side of the joint.
- D. Grid shall be installed with pipes intersecting on centers shown on the drawings.
1. All intersections shall be connected using a right angle or variable angle intersection clamps as required.
 2. Intersection clamps shall be made of two 3/16" thick, painted steel plates formed to grip 1-1/2" NPS schedule 40 pipes at right angles.
 3. Intersection clamps shall be complete with four 3/8" x 1" hex bolts with lock nuts.
 4. Intersection clamps shall have a recommended working load of at least 1500#.
- E. Each pipe shall terminate short of the walls.
1. Attach minimum two pipes per side to wall using pipe-end brackets as shown on drawings.
 2. Secure pipe to wall bracket with u-bolt, sized to pipe O.D.
 3. Anchor all brackets to structural walls. Where acoustic material is applied over the wall, notch acoustic material around pipe.
 - a. All notches shall be neat and uniform.
- F. The grid shall be hung from the building structure using 1/4" 7x19 galvanized utility cable, proof coil chain, or 1/2" diameter all-thread rod ending attached to pipe clamps.
1. At each point, the cable, chain or all-thread rod shall attach to the overhead steel with an appropriate fitting.
 2. Cables shall be formed over thimbles of correct size and fastened with Nicopress sleeves crimped to manufacturers' recommendations.
 3. Where turnbuckles are used, all turnbuckles shall be moused after final trimming of the pipe grid.
 4. Hanger hardware shall be rated to support either a 40 plf distributed load on the pipe grid or 450 lbs, whichever is greater.
 5. Install hangers plumb in all directions.

- G. Pipe grid shall hang plumb and level in all directions.

PART 3 - EXECUTION

3.1 GENERAL

- A. Examine all conditions under which all items shall be installed and notify the Owner and Architect in writing of any condition detrimental to the proper and timely completion of the work.
- B. Responsibility for the satisfactory completion of this work shall rest solely and exclusively with the Contractor.
- C. The Contractor shall be responsible for storage of all equipment and tools during the period of installation and shall be responsible for collecting and removing from the job site all packing materials, trash, scrap materials, etc.
- D. The Contractor shall be responsible for the protection of equipment and/or finished materials provided by other Contractors.

3.2 INSTALLATION SUPERVISION

- A. Installation of the items described in this section shall be supervised by the Contractor's own experienced superintendent having extensive experience in installing work of this kind.
 - 1. Superintendent shall be an Entertainment Technician Certification Program (ETCP) Certified Rigger - Theatre.
 - a. Rigging System Contractor shall provide the Architect with a copy of the superintendent's ETCP certification and shall make a copy of this certification available on the job site for the length of the installation.
 - 2. An ETCP Certified Rigger - Theatre shall be present at all times during the pipe grid installation.
- B. The same individual shall remain in charge of the work throughout the installation until work is completed excepting only the intervention of circumstances completely beyond the control of the Contractor.
- C. The superintendent shall represent the Contractor and all directions given to him shall be binding as if given to the Contractor.
 - 1. The Contractor may require the Owner to confirm such directions in writing.

3.3 FIELD QUALITY CONTROL

- A. All equipment shall be installed in locations shown on Construction Drawings.
- B. Installations shall be performed in accordance with OSHA Safety and Health Standards and all local codes.

- C. All welding shall be in full compliance with the most recent edition of the Structural Welding Code (ANSI / AWS D1.1).
- D. All components shall function as designed and be installed plumb, straight and true.
- E. The Contractor shall do all drilling and fitting required in the setting of materials in place, and shall do all cutting and fitting required in connection with the fitting of his materials to the adjoining work of other Contractors.
- F. The Contractor shall provide all connecting members, brackets, etc., as required for properly supporting and securing his work to the masonry, joints, walls, structural members, or other parts of the building as may be best suited for each condition.
- G. Install the items described in this section in locations shown on the drawings.

END OF SECTION 116129

SECTION 116133 – ORCHESTRA PIT INFILL PLATFORMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK OF THIS SECTION

- A. This Section includes all labor, materials, equipment and services necessary to manufacture, deliver to job site and install the portable platforms as shown on the drawings and specified herein, including but not limited to the following:
 - 1. Adjustable height, post and beam style portable pit filler platform system for infill of orchestra pit at orchestra seating level and as a stage extension at stage floor level.
 - 2. Adjustable height portable pit filler platform system for infill of orchestra pit at orchestra seating level and as a stage extension at stage floor level.
 - 3. Rolling storage carts.
- B. It shall be the responsibility of the Platform Manufacturer to furnish equipment complete in all respects and to provide any additional equipment required to fulfill the intent of these drawings and specifications whether or not such items are herein specified or indicated.

1.3 PROJECT CONDITIONS

- A. All dimensions shall be verified in the field, prior to fabrication by the Platform Manufacturer who shall make at least one visit to the job site prior to fabrication of the platforms.
- B. Gap tolerance between platforms and adjacent walls shall be maximum 1/4" +/- 1/16".
- C. No extras will be allowed because of the Platform Manufacturer's misunderstanding as to the amount of work involved or his lack of knowledge of any of the conditions pertaining to the work based on neglect or failure to visit or make a proper examination of the site.

1.4 SUBMITTALS

- A. The Platform Manufacturer shall prepare and submit complete shop drawings according to requirements set forth in the Contract Documents.
- B. Shop drawings shall be submitted to and reviewed by the Architect before fabrication begins.
 - 1. Such review does not relieve the Platform Manufacturer of the responsibility of providing equipment in accordance with this Specification.

- C. Shop drawings shall show dimensions, sizes, thicknesses, gauges, finishes, joining, attachments, and relationship of work to adjoining construction.
- D. Catalog work sheets showing illustrated cuts of items may be submitted for standard manufactured items.
- E. The Platform Manufacturer shall submit record shop drawings, showing the arrangement and details of the initial installation.
- F. After the installation is complete, the Platform Manufacturer shall provide the Owner with Operations and Maintenance Manuals not more than 14 days after the checkout is completed.
 - 1. Each O&M manual shall include, but not be limited to, the following:
 - a. Assembly instruction manuals.
 - b. Copies of all record shop drawings.
 - c. Catalog cuts of all portable platform equipment.
 - d. Recommendations for periodic maintenance.
 - e. World Wide Web address for on-line access to manuals, product literature and troubleshooting guides.
 - 2. One O&M manual shall be a printed hard copy.
 - 3. O&M manual shall also be provided in electronic format on two flash drives.

1.5 WARRANTY

- A. The Platform Manufacturer shall assure that the platforms are properly installed, free of defects in materials and workmanship and shall provide a warranty on all equipment and workmanship provided under this contract for a period of two years from the date of the final acceptance by the Owner.
- B. During the warranty period, repair or replacement of defective materials and/or repairs of faulty workmanship shall be provided, at no cost to the Owner, within 10 days of written notification of defect(s).

1.6 DELIVERY

- A. Delivery shall be as required in the Contract Documents.
- B. Deliver all material to the job site suitably crated, packed, and protected.
 - 1. Each crate or carton shall be clearly marked on the outside with the Manufacturer's identification label and the nomenclature of the product contained within.

1.7 MANUFACTURERS

- A. Basis of design for the pit filler platforms is *Strata Orchestra Pit Filler* portable platforms as manufactured by:

1. Wenger Corporation
1078-S Wenger Building
Owatonna, Minn. 55060
Contact: Warren Givens warren.givens@wengercorp.com
800-733-0393

B. Products of other manufacturers may be acceptable. However, manufacturers capable of providing specified products shall not, for convenience of their normal production methods, vary from the specification. Manufacturers listed as “alternative” are not relieved of the responsibility of meeting these specifications. Owner and Architect shall be the sole parties capable of determining bidder’s compliance with specifications. Alternative manufacturers for work of this section shall include the following:

1. SECOA
8650 109th Avenue North
Champlin, MN 55316
Contact: Jeff Jones j.jones@secoa.com
800-328-5519
2. Staging Concepts Inc.
7008 Northland Drive, Suite 150
Minneapolis, MN 55428
Contact: Brian Arnold barnold@stagingconcepts.com
800-337-5339
3. StageRight Corp.
Contact: Kip Weis kweis@stageright.com
800-438-4499 x349

PART 2 - PRODUCTS

2.1 PORTABLE POST AND BEAM PIT FILLER PLATFORMS

- A. Provide portable platforms with height adjustability as shown on the drawings.
 1. Platform curves shall match corresponding architecture.
 2. Verify measurements in field before beginning construction.
- B. Provide sets of legs as required to meet height adjustability requirements of orchestra seating level to stage level.
- C. Design Requirements:
 1. Portable interlocking platform system with detachable and interchangeable columns diagonally braced to support platform decking.
 2. Each column shall be equipped with screw foot leveling.
 3. Pit Filler system may be made up of several independent units connected.
 4. Deck panels shall be individually removable and isolated from adjacent panels.
- D. Performance Requirements:
 1. Capable of supporting a uniform vertical load of 125 psf.

2. Under rated load of 125 psf, unit deflection shall not exceed $L/360$ with 6'-0" length panels.
 3. Point loads: Capable of withstanding without damage 500 lbs. from 2" caster.
- E. Provide prominent numbers on the underside of each platform, with an arrow indicating downstage.
1. These numbers are to correspond to installation layout chart provided by the manufacturer indicating order of installation.
- F. Platforms shall be fitted with locking devices to permit easy, secure interconnection of the platforms.
1. When engaged, lock devices shall ensure a firm seal wherever platforms join and maintain the floor surfaces of all platforms at a uniform elevation.
 2. Locking devices shall be easily accessible and designed so that performance shall not be impaired by any build-up of dust or dirt.
- G. All materials and construction techniques shall comply with all applicable fire, safety, and building codes.
- H. Performance Characteristics:
1. Platforms shall be built in the modules as shown on the drawings.
 - a. All identical platforms shall be interchangeable.
 2. Composite Panel Deck:
 - a. Top surface shall be tempered pressed hardboard. The entire top surface shall be painted black.
 - b. Faces: 11/32" A-C Group One exterior plywood.
 - c. Core: Phenolic impregnated paper honeycomb.
 - d. Traffic surface: 1/8-inch tempered hardboard.
 - e. Edges: Extruded PVC with glass-filled nylon corners.
 - f. Panel attachments: Integral spring-loaded screw assemblies that attach panel to supporting understructure.
 3. Understructure Framing Components:
 - a. Main framing (beams, columns and bracing): 6063 aluminum extrusion, mill finish.
 - b. Component connection brackets: Mill finish aluminum or metallic gray powder-coated steel.
 - c. Exposed hardware: zinc-plated finish.
 - d. Main support beam extrusion shall contain two parallel tracks to allow two adjacent platform panels to be connected.
 - e. Furnish crossbeam extrusion with single track for platform panel connection. Attach cross beam to main support beam with pin and socket design requiring no tools. Allow for angled adjustment as required for custom orchestra pit requirements.
 - f. Deck units shall fasten to main and intermediate beams and remain acoustically isolated from each other prohibiting noise from friction between deck units.
 4. Column Assemblies:
 - a. Columns: Extruded structural aluminum shapes in lengths to provide platform heights, mill finish aluminum.
 - b. Column to main-support beams: Pinned connection requiring no tools.

- c. Column adjustment: Threaded foot for leveling. Adjustment range of the footpad shall be plus or minus 2".
 - d. Bracing: Permanently attached to main support beams and intermediate beams. Bracing connection to columns shall be a pinned connection requiring no tools.
 5. Beam-to-House-Floor-Edge Connection:
 - a. Each main beam shall be attached to the stage with an adjustable beam-to-stage bracket.
 - b. Each attaching point will consist of one threaded insert in the face or underside of the stage and one threaded locking device, 3/8" diameter (minimum).
 6. As shown on the drawings, provide removable hard closure panels to fill gap between pit platforms underside of the stage when platforms are at the auditorium orchestra seating level.
- I. Provide platform storage carts capable of holding platforms in horizontal position
1. Carts shall have a locking device to secure platforms during transport.
 2. Frame storage cart capable of holding main beams, intermediate beams and columns.
 3. Column storage cart capable of holding columns.
 4. Carts shall have four minimum 6" diameter ball-bearing casters, each rated at 900 pounds. Two casters shall be swivel, and two shall be fixed.

PART 3 - EXECUTION

3.1 GENERAL

- A. Responsibility for the satisfactory completion of the manufacturer and installation of these systems shall rest solely and exclusively with the Platform Manufacturer.
- B. The Platform Manufacturer shall carry out the installation of the complete systems using experienced professional Platform technicians.
 1. The Platform Manufacturer shall not employ any person to do the work of a particular craft unless that person is qualified in that craft.
 2. Installation shall be supervised by the Platform Manufacturer's own experienced superintendent having extensive experience in installing work of this kind.
 - a. The same individual shall remain in charge of the Work throughout the installation of the system until Work is completed excepting only the intervention of circumstances completely beyond the control of the Platform Manufacturer.
 - b. The superintendent shall represent the Platform Manufacturer in his absence and all directions given him shall be binding as if given to the Platform Manufacturer.
- C. Field trim and finish deck units to the jobsite conditions as required and cover with PVC edge extrusion.
- D. Platform Manufacturer shall repair damage to the platform system or surroundings occurring during installation.
- E. Surfaces and materials of the Platforms shall be cleaned of debris, dirt and foreign materials.

- F. The Platform Manufacturer shall remove all wastes and trash from the building daily.
- G. The Platform Manufacturer shall provide up to four hours training to the Owner's representatives in the set-up and dismantling procedures of the Platforms Systems.

END OF SECTION 116133

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Manually operated roller shades with single rollers
2. Manually operated roller shades with double rollers
3. Motor operated roller shades with single rollers
4. Motor operated roller shades with double rollers.

- B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
2. Section 079000 – "Joint Protection" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.
3. Refer to Drawings for locations of each shade-type.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

- C. Samples: For each exposed product and for each color and texture specified, 10 inches (250 mm) long.

- D. Samples for Verification: For each type of roller shade.

1. Shadeband Material: Not less than 10 inches (250 mm) square. Mark inside face of material if applicable.
2. Roller Shade: Full-size operating unit, not less than 16 inches (400 mm) wide by 36 inches (900 mm) long for each type of roller shade indicated.
3. Installation Accessories: Full-size unit, not less than 10 inches (250 mm) long.

- E. Roller-Shade Schedule: Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of shadeband material, signed by product manufacturer.
- A. Product Test Reports: For each type of shadeband material, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- 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. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product:
 - 1. Manufacturer: MechoShade Systems, Inc
 - 2. System:
 - a. Classic Mecho/5 roller shade system for manual shades
 - b. Mecho/5 Doubleshades for dual roll manual shades

or comparable product by one of the following:

- c. Draper Inc.
 - d. Hunter Douglas Contract.
 - e. Lutron Electronics Co., Inc.
 - f. MechoShade Systems, Inc.
 - g. Skyco Architectural Shading Solutions
- B. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS (Refer to Drawings for location)

- A. 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. Bead Chains: Stainless steel.
 - a. Loop Length: Full length of roller shade
 - b. Limit Stops: Provide upper and lower ball stops.

2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller-shade weight and lifting heavy roller shades.
 - a. Provide for shadebands that weigh more than 10 lb (4.5 kg) or for shades as recommended by manufacturer, whichever criteria are more stringent.
- B. Spring Operating Mechanisms: Roller contains spring sized to accommodate shade size indicated. Provide with positive locking mechanism that can stop shade movement at each half-turn of roller and with manufacturer's standard pull.
 1. Pole: Manufacturer's standard type in length required to make operation convenient from floor level and with hook for engaging pull.
- C. 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 inside face of shade
 2. Direction of Shadeband Roll: Regular, from back of roller.
 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- E. 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.
- F. Shadebands:
 1. Shadeband Material: Light-filtering fabric.
 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.
- G. Installation Accessories:
 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open, but not less than 3 inches (76 mm).
 2. Endcap Covers: To cover exposed endcaps.
 3. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.

4. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
5. Installation Accessories Color and Finish: To match existing storefront system.

2.3 MANUALLY OPERATED, DOUBLE-ROLLER SHADES

- A. 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. Bead Chains: Stainless steel.
 - a. Loop Length: Full length of roller shade
 - b. Limit Stops: Provide upper and lower ball stops.
 2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller-shade weight and lifting heavy roller shades.
 - a. Provide for shadebands that weigh more than 10 lb (4.5 kg) or for shades as recommended by manufacturer, whichever criteria are more stringent.
- B. Spring Operating Mechanisms: Roller contains spring sized to accommodate shade size indicated. Provide with positive locking mechanism that can stop shade movement at each half-turn of roller and with manufacturer's standard pull.
 1. Pole: Manufacturer's standard type in length required to make operation convenient from floor level and with hook for engaging pull.
- C. 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 shades for service.
 1. Double-Roller Mounting Configuration: Offset, outside shade over and inside shade under
 2. Inside Roller:
 - a. Drive-End Location: As indicated on drawings
 - b. Direction of Shadeband Roll: Regular, from back of roller
 3. Outside Roller:
 - a. Drive-End Location: As indicated on drawings
 - b. Direction of Shadeband Roll: Regular, from back of roller
 4. Shadeband-to-Roller Attachment: Manufacturer's standard method
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.

- E. 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.
- F. Inside Shadebands:
 - 1. Shadeband Material: Light-filtering fabric
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.
- G. Outside Shadebands:
 - 1. Shadeband Material: Light-blocking fabric
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.
- H. Installation Accessories:
 - 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open.
 - 2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open.
 - 3. Endcap Covers: To cover exposed endcaps.
 - 4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open, but not less than 4 inches (102 mm)
 - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.
 - 5. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recesses or pockets and for snap-in attachment to wall clip without fasteners.
 - 6. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.

7. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
 8. Installation Accessories Color and Finish: To match existing curtainwall system
- 2.4 MOTOR-OPERATED, SINGLE-ROLLER SHADES (Light Blocking Only - Refer to Drawings for location)
- A. Motorized Operating Systems: Provide factory-assembled, shade-operator systems of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-rewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Electric Motor: Manufacturer's standard tubular, enclosed in rollers.
 - a. Electrical Characteristics: Single phase, 120/240 VAC, 60 Hz.
 - b. Needs to be compatible with Crestron Control System specified in Special Systems drawings.
 3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for flush mounting. Provide the following for remote-control activation of shades:
 - a. Group Control Station: Momentary-contact, three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for single-switch group control. Control station shall be located in electrical room adjacent to lighting control panel.
 - b. Timer Control: Astronomical clock timer, which closes shades one-half hour before sunset and opens shades one-half hour after sunrise.
 - c. Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features; isolated from voltage spikes and surges.
 - d. Color: As selected by Architect from manufacturer's full range
 4. Crank-Operator Override: Crank and gearbox operate shades in event of power outage or motor failure.
 5. Limit Switches: Adjustable switches interlocked with motor controls and set to stop shades automatically at fully raised and fully lowered positions.
 6. Operating Features:
 - a. Group switching with integrated switch control; single faceplate for multiple switch cutouts.
 - b. Override switch.
- B. 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 inside face of shade
 2. Direction of Shadeband Roll: Regular, from back of roller.
 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
- A. 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.
- B. Shadebands:
1. Shadeband Material: Light-Blocking fabric.
 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.
- C. Installation Accessories:
1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open.
 2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open.
 3. Endcap Covers: To cover exposed endcaps.
 4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open, but not less than 4 inches (102 mm)
 - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.
 5. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recesses or pockets and for snap-in attachment to wall clip without fasteners.
 6. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
 7. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
 8. Installation Accessories Color and Finish: To match existing curtainwall system

2.5 MOTOR-OPERATED, DOUBLE-ROLLER SHADES (Refer to Drawings for location)

- A. Motorized Operating Systems: Provide factory-assembled, shade-operator systems of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-rewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Electric Motor: Manufacturer's standard tubular, enclosed in rollers.
 - a. Electrical Characteristics: Single phase, 120/240 VAC, 60 Hz.
 - b. Needs to be compatible with Crestron Control System specified in Special Systems drawings.
 3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for flush mounting. Provide the following for remote-control activation of shades:
 - a. Group Control Station: Momentary-contact, three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for single-switch group control. Control station shall be located in electrical room adjacent to lighting control panel.
 - b. Timer Control: Astronomical clock timer, which closes shades one-half hour before sunset and opens shades one-half hour after sunrise.
 - c. Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features; isolated from voltage spikes and surges.
 - d. Color: As selected by Architect from manufacturer's full range
 4. Crank-Operator Override: Crank and gearbox operate shades in event of power outage or motor failure.
 5. Limit Switches: Adjustable switches interlocked with motor controls and set to stop shades automatically at fully raised and fully lowered positions.
 6. Operating Features:
 - a. Group switching with integrated switch control; single faceplate for multiple switch cutouts.
 - b. Override switch.
- B. 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 shades for service.
1. Double-Roller Mounting Configuration: Offset, outside shade over and inside shade under
 2. Inside Roller:
 - a. Drive-End Location: As indicated on drawings
 - b. Direction of Shadeband Roll: Regular, from back of roller
 3. Outside Roller:
 - a. Drive-End Location: As indicated on drawings

- b. Direction of Shadeband Roll: Regular, from back of roller
- 4. Shadeband-to-Roller Attachment: Manufacturer's standard method
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
- D. 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.
- E. Inside Shadebands:
 - 1. Shadeband Material: Light-filtering fabric
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.
- F. Outside Shadebands:
 - 1. Shadeband Material: Light-filtering fabric
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.
- G. Installation Accessories:
 - 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open.
 - 2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open.
 - 3. Endcap Covers: To cover exposed endcaps.
 - 4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open, but not less than 4 inches (102 mm)
 - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.
 - 5. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recesses or pockets and for snap-in attachment to wall clip without fasteners.
 - 6. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
 - 7. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.

8. Installation Accessories Color and Finish: To match existing curtainwall system

2.6 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with [NFPA 701] <Insert requirement>. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
 1. Source: Roller-shade manufacturer.
 2. Type: Thermoveil Dense Basket Weave 1500 Series
 3. Roll Width: Varies per drawings.
 4. Orientation on Shadeband: Up the bolt.
 5. Color: To be selected by Architect from standard colors.
 6. Openness Factor North/South Windows: 3 percent.
 7. Openness Factor East/West Windows: 1 percent.
- C. Light-Blocking Fabric: Opaque fabric, stain and fade resistant.
 1. Source: Roller-shade manufacturer.
 2. Type: Equinox Blackout 0100 Series
 3. Roll Width: Varies per drawings.
 4. Orientation on Shadeband: Up the bolt.
 5. Color: As indicated on Drawings.

2.7 ROLLER-SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. 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 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.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance of the Work.

ROLLER WINDOW SHADES

122413 -

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER-SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades.

END OF SECTION 122413

SECTION 123616 - METAL COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Stainless-steel countertops.

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded wall-mounted shelves.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- C. 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.
 - 3. For wall-mounted shelves, indicate requirements for blocking or reinforcements in supporting construction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products only after casework and supports on which they will be installed has been completed in installation areas.
- B. Keep finished surfaces of products covered with polyethylene film or other protective covering during handling and installation.

1.6 FIELD CONDITIONS

- A. Field Measurements: Where products are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Established Dimensions: Where products are indicated to fit to other construction, establish dimensions for areas where products are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 STAINLESS-STEEL FABRICATIONS

- A. Countertops: Fabricate from 0.062-inch-thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 1/2 inch over 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 1-1/2 inch-thick edge with a 1/2-inch return flange.
 - 5. Form the backsplash coved to and integral with top surface, with a 1/2-inch-thick top edge and 1/2-inch return flange.
 - 6. Provide raised (marine) edge around perimeter of tops containing sinks; pitch tops containing sinks two ways to provide drainage without channeling or grooving.

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, neutral curing, silicone.
 - 2. Color: Clear.
 - 3. Sealant shall have a VOC content of 250 g/L or less.

4. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

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 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.
- B. Secure countertops to cabinets with Z- or L-type fasteners or equivalent; use two or more fasteners at each front, end, and back.
- C. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
- D. Seal junctures of countertops, splashes, and walls with sealant for countertops.

3.3 CLEANING AND PROTECTION

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces. Remove and replace damaged products or touch up and refinish damaged areas to match original factory finish, as approved by Architect.
- C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 123616

SECTION 123623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes
 - 1. Plastic-laminate-clad countertops.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Sustainable Design Submittals:
 - 1. Environmental Product Declaration (EPD): For each product.
 - 2. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
 - 3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 4. Product Data: For installation adhesives, indicating VOC content.
 - 5. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.
 - 6. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For plastic-laminate-clad countertops.
 - 1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
 - 2. Show locations and sizes of cutouts and holes for items installed in plastic-laminate-clad countertops.
 - 3. Apply AWI Quality Certification Program label to Shop Drawings.
- D. Samples: Plastic laminates in each type, color, pattern, and surface finish required in manufacturer's standard size.
- E. Samples for Initial Selection: For plastic laminates.

F. Samples for Verification: As follows:

1. Plastic Laminates: For each type, color, pattern, and surface finish required, 8 by 10 inches in size.
2. Wood-Grain Plastic Laminates: For each type, color, pattern, and surface finish required, 12 by 24 inches in size.
3. Fabrication Sample: For each type and profile of countertop required, provide one sample applied to core material with specified edge material applied to one edge.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For the following:

1. Composite wood and agrifiber products.
2. High-pressure decorative laminate.
3. Chemical-resistant, high-pressure decorative laminate.
4. Adhesives.

C. Quality Standard Compliance Certificates: AWI Quality Certification Program.

D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Shop Certification: AWI's Quality Certification Program accredited participant.

B. Installer Qualifications: Fabricator of products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.

B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

C. Keep surfaces of countertops covered with protective covering during handling and installation.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- C. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- D. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.
 - 1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that countertops comply with requirements of grades specified.
 - 2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Regional Materials: Wood products shall be manufactured within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.
- C. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
- D. Grade: Custom.
- E. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGL.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Abet Laminati Inc.
 - b. Formica Corporation.
 - c. Lamin-Art, Inc.
 - d. Nevamar; a Panolam Industries International, Inc. brand.
 - e. Pionite; a Panolam Industries International, Inc. brand.
 - f. Wilsonart LLC.

 - F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 1. As indicated by manufacturer's designations.
 2. Match Architect's sample.
 3. As selected by Architect from manufacturer's full range in the following categories:
 - a. Solid colors, matte finish.
 - b. Wood grains, matte finish with grain running parallel to length of countertop.
 - c. Patterns, matte finish.

 - G. Edge Treatment: 3.0-mmPVC edging.

 - H. Core Material: Particleboard or MDF.

 - I. Core Material at Sinks: exterior-grade plywood.

 - J. Core Thickness: 3/4 inch.
 1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

 - K. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

 - L. Paper Backing: Provide paper backing on underside of countertop substrate.
- 2.2 WOOD MATERIALS
- A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
 1. Wood Moisture Content: 5 to 10 percent.

 - B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of countertop and quality grade specified unless otherwise indicated.

1. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
2. Recycled Content of MDF and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
3. MDF: Medium-density fiberboard, ANSI A208.2, Grade 130.
4. Particleboard: ANSI A208.1, Grade M-2.
5. Straw-Based Particleboard: ANSI A208.1, Grade M-2, except for density.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Panel Source International, Inc.
 - 2) Sorm Incorporated.
6. Softwood Plywood: DOC PS 1.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products according to test method indicated by a qualified testing agency.
1. Use treated materials that comply with requirements of referenced quality standard. 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 according to 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 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 or natural transparent finish, use organic resin chemical formulation.
 3. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking shop certified by testing and inspecting agency.
 4. 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 exposed treated
woodwork.

- C. Fire-Retardant Particleboard: Made from softwood particles and fire-retardant chemicals mixed at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less when tested according to ASTM E84.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Flakeboard Company Limited.
 - b. SierraPine.
 2. For panels 3/4 inch thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, 1600 psi; modulus of elasticity, 300,000 psi; internal bond, 80 psi; and screw-holding capacity on face and edge, 250 and 225 lbf, respectively.
 3. For panels 13/16 to 1-1/4 inches thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: modulus of rupture, 1300 psi; modulus of elasticity, 250,000 psi; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf, respectively.
- D. Fire-Retardant MDF: Medium-density fiberboard 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 according to ASTM E84.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Panel Source International, Inc.
 - b. SierraPine.

2.4 ACCESSORIES

- A. Wire-Management Grommets: Circular, molded-plastic grommets and matching plastic caps with slot for wire passage.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Doug Mockett & Company, Inc.
 2. Outside Diameter: 2 inches.
 3. Color: Light Grey or White

2.5 MISCELLANEOUS MATERIALS

- A. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Adhesive for Bonding Plastic Laminate: Contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive.
- C. Installation Adhesive:
 - 1. Adhesives shall have a VOC content of 70 g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.6 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:
 - 1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times countertop fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended, and check measurements of assemblies against field measurements before disassembling for shipment.
- D. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of cutouts by saturating with varnish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing.

3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
 - 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 2. Seal edges of cutouts by saturating with varnish.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and 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.
 - 1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical-treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
 - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash

abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semiexposed surfaces.
- C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 123623.13

SECTION 123661.16 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid surface material countertops.
 - 2. Solid surface material backsplashes.
 - 3. Solid surface material end splashes.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Sustainable Design Submittals:
 - 1. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
 - 2. Product Data: For adhesives, indicating VOC content.
 - 3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 4. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
 - 1. Show locations and details of joints.
 - 2. Show direction of directional pattern, if any.
- D. Samples for Initial Selection: For each type of material exposed to view.
- E. Samples for Verification: For the following products:
 - 1. Countertop material, 6 inches square.
 - 2. Wood trim, 8 inches long.
 - 3. One full-size solid surface material countertop, with front edge, 8 by 10 inches, of construction and in configuration specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.
- C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
 - 1. Build mockup of typical countertop as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Affinity Surfaces; a brand of Domain Industries, Inc.

- b. Avonite Surfaces.
 - c. Durasein Solid Surface; a brand of Relang International, LLC.
 - d. E. I. du Pont de Nemours and Company.
 - e. Formica Corporation.
 - f. LG Chemical, Ltd.
 - g. Meganite Inc.
 - h. Samsung Chemical USA, Inc.
 - i. Swan Corporation (The).
 - j. Transolid Div of Trumbull Industries.
 - k. Wilsonart LLC.
2. Type: Provide Standard type unless Special Purpose type is indicated.
 3. Colors and Patterns: Match Architect's samples.
- B. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
- C. 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: Straight, slightly eased at top.
 2. Backsplash: Straight, slightly eased at corner.
 3. End Splash: Matching backsplash, as indicated on drawings.
- C. Countertops: 1/2-inch-thick, solid surface material with front edge built up with same material.
- D. Backsplashes: 3/4-inch- thick, solid surface material.
- E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
1. Fabricate with loose backsplashes for field assembly.
 2. Install integral sink bowls in countertops in the shop.
- F. Joints: Fabricate countertops less than 140 inches long, without joints.

- G. Joints: Fabricate countertops greater than 140 inches long, in sections for joining in field, with joints at locations indicated.
 - 1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
 - 2. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints where indicated. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.

- H. Cutouts and Holes:
 - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures **in shop** using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.
 - 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
 - 1. Adhesives shall have a VOC content of 70g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- C. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- D. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- F. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Pre-drill holes for screws as recommended by manufacturer.
- 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

SECTION 123661.19 - QUARTZ AGGLOMERATE COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Quartz agglomerate countertops.
 - 2. Quartz agglomerate Backsplash.
- B. Related Requirements:
 - 1. Division 22 for sinks and plumbing fittings.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Sustainable Design Submittals:
 - 1. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
 - 2. Product Data: For adhesives, indicating VOC content.
 - 3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 4. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
 - 1. Show locations and details of joints.
 - 2. Show direction of directional pattern, if any.
- D. Samples for Initial Selection: For each type of material exposed to view.
- E. Samples for Verification: For the following products:
 - 1. One full-size quartz agglomerate countertop, with front edge, 8 by 10 inches, of construction and in configuration specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For quartz agglomerate countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.
- C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
 - 1. Build mockup of typical countertop as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

- A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

QUARTZ AGGLOMERATE COUNTERTOPS

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- a. C&C North America, Inc.; Cosentino North America.
- b. Cambria.
- c. E. I. du Pont de Nemours and Company.
- d. LG Chemical, Ltd.
- e. Meganite Inc.
- f. Samsung Chemical USA, Inc.
- g. Technistone USA, Inc.
- h. Terrazzo & Marble Supply Companies.
- i. Transolid Div of Trumbull Industries.
- j. Wilsonart LLC.

2. Colors and Patterns: Match Architect's samples.

- B. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
- C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 1. Grade: Custom.
- B. Configuration:
 1. Front: Straight, slightly eased at top.
 2. Backsplash: Straight, slightly eased at corner.
 3. End Splash: None.
- C. Countertops: 1/2-inch- thick, quartz agglomerate with front edge built up with same material.
- D. Backsplashes: 3/4-inch- thick, quartz agglomerate where indicated.
- E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 1. Fabricate with loose backsplashes for field assembly.
- F. Joints: Fabricate countertops under 120 inches long, without joints.

- G. Joints: Fabricate countertops greater than 120 inches long in sections for joining in field, with joints at locations indicated.
1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
 2. Joint Type: Bonded, 1/32 inch or less in width.
 3. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint where applicable to project conditions.
- H. Cutouts and Holes:
1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.
 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by quartz agglomerate manufacturer.
1. Adhesives shall have a VOC content of 70 g/L or less.
 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive quartz agglomerate countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

QUARTZ AGGLOMERATE COUNTERTOPS

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3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- C. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- D. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Install metal splines in kerfs in countertop edges at joints where applicable for project conditions. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- F. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Pre-drill holes for screws as recommended by manufacturer.
- 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 123661.19

SECTION 124813 - ENTRANCE FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Roll-up rail mats.
 - 2. Recessed frames.

1.3 COORDINATION

- A. Coordinate size and location of recesses in concrete to receive floor mats and frames.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for floor mats and frames.
- B. Shop Drawings:
 - 1. Items penetrating floor mats and frames, including door control devices.
 - 2. Divisions between mat sections.
 - 3. Perimeter floor frames.
- C. Samples: For the following products, in manufacturer's standard sizes:
 - 1. Floor Mat: Assembled sections of floor mat.
 - 2. Tread Rail: Sample of each type and color.
 - 3. Frame Members: Sample of each type and color.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For floor mats and frames to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Resilient-Tile Entrance Mats: Full-size tile units equal to 2 percent of amount installed, but no fewer than 4 units.

PART 2 - PRODUCTS

2.1 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

- A. Structural Performance: Provide roll-up rail mats and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform floor load of 300 lbf/sq. ft.
 - 2. Wheel load of 350 lb per wheel.
- B. Accessibility Standard: Comply with applicable provisions in the DOJ's "2010 ADA Standards for Accessible Design".

2.2 ROLL-UP RAIL MATS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amarco Products.
 - 2. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - 3. Matco International.
 - 4. Mats Incorporated.
- B. Roll-up, Aluminum-Rail Hinged Mats: Extruded-aluminum tread rails 1-1/2 inches wide by 3/8 inch thick, sitting on continuous vinyl cushions.
 - 1. Tread Inserts: 1/4-inch-high, 28-oz./sq. yd. weight, level-cut, nylon-pile, fusion-bonded carpet.
 - 2. Colors, Textures, and Patterns of Inserts: As selected by Architect from full range of industry colors.
 - 3. Rail Color: Clear.
 - 4. Hinges: Aluminum.
 - 5. Mat Size: As indicated.

2.3 FRAMES

- A. Recessed Frames: Manufacturer's standard extrusion.

1. Extruded Aluminum: ASTM B221, Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
 - a. Color: As selected by Architect from Manufacturer's full range.

2.4 CONCRETE FILL AND GROUT MATERIALS

- A. Provide concrete fill and grout equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

2.5 FABRICATION

- A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.
- B. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.
 1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.
- C. Surface-Mounted Frames: As indicated for permanent surface-mounted installation, complete with corner connectors, splice plates or connecting pins, and postinstalled expansion anchors.
- D. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's standard protective coating.

2.6 ALUMINUM FINISHES

- A. Aluminum finish as selected by Architect from Manufacturer's standard finish options, below.
 1. Mill finish.
 2. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 3. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and floor conditions for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install recessed mat frames and mats to comply with manufacturer's written instructions so that tops of mats will be flush with adjoining finished flooring. Set mats with tops at height recommended by manufacturer for most effective cleaning action; coordinate tops of mat surfaces with bottoms of doors that swing across mats to provide clearance between door and mat.
 - 1. For installation in terrazzo flooring areas, allow for grinding and polishing of terrazzo without grinding surface of recessed frames. Coordinate with other trades as required.
 - 2. Install necessary shims, spacers, and anchorages for proper location, and secure attachment of frames.
 - 3. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.
 - 4. Delay setting mats until construction traffic has ended.
- B. Install surface-type units to comply with manufacturer's written instructions; coordinate with entrance locations and traffic patterns.
 - 1. Anchor fixed surface-type frame members to floor with devices spaced as recommended by manufacturer.

3.3 PROTECTION

- A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 124813

SECTION 126113 –UPHOLSTERED FIXED AUDIENCE SEATING

PART 1 - GENERAL

1.1 WORK OF THIS SECTION

- A. This Section includes all labor, materials, equipment, and services necessary to manufacture, deliver to job site, and install floor-mounted fixed seating as specified herein. This Specification shall apply to upholstered fixed audience seating in the Proscenium Theater.

1.2 GENERAL REQUIREMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related work in other Sections:
 - 1. Electrical Drawings and Specifications
 - 2. Architect's Finish/Color Schedule

1.3 SUBMITTAL WITH BID

- A. The Fixed Seating Manufacturer shall submit a list of not less than five installations of similar scope and size, installed by the bidder, that have been in service for a minimum of one year and a maximum of five years.
- B. The Fixed Seating Manufacturer shall also submit for review by the Architect the following samples and certificates:
 - 1. One notarized certificate of compliance with ASTM A-48 Class 25 for all gray iron castings.
 - 2. One notarized certificate of compliance with California Bulletin #117.
- C. The Fixed Seating Manufacturer shall submit with its proposal illustrations, specifications, and other data pertinent to the construction of its product.
- D. Furnish with bid a schedule of the following:
 - 1. Length of time required to prepare shop drawings.
 - 2. Length of time required to supply all equipment.
 - 3. Length of time required to install all equipment.
- E. With bid submittal, Fixed Seating Manufacturer shall provide new fixed seating product literature with standard styles offered, in the event that the Owner wishes to make alternative selections.

1.4 SUBMITTALS

- A. Fixed Seating Manufacturer shall prepare and submit complete shop drawings according to the requirements set forth in the Contract Documents.

1. Shop drawings shall be submitted to and reviewed by the Architect before fabrication begins. Such review does not relieve the Fixed Seating Manufacturer of the responsibility to provide equipment in accordance with this Specification.
 2. Shop drawings shall include ¼” scale plans showing complete field dimensions, including accurate measurements of actual row lengths and row spacing, and measurements from edge of stage to back of each row.
 - a. Where field dimensions differ from Construction Drawings, shops drawings shall indicate Fixed Seating Manufacturer’s proposed changes in seat width layout based on accurate field measurements.
 - b. Proposed changes are subject to review by Architect.
 3. Seat anchorage details shall clearly indicate the method used and the devices employed for attaching anchors to existing concrete and wood floors.
 4. All materials, finishes, and construction of fixed seating shall be detailed in the shop drawings including but not limited to:
 - a. Seat pans and upholstery
 - b. Seat backs and upholstery
 - c. Aisle standards and middle standards, including ADA-compliant aisle standards
 - d. Armrests
 - e. Aisle lighting, including transformer, noting color temperature
 - f. Number, letter, and donor plates
 5. Shop drawings shall include the following related to electrical work:
 - a. Detail showing mounting of aisle light to aisle standard
 - b. Detail showing mounting of aisle light junction box and conduit
 - c. Aisle lighting wiring diagram showing all interconnections
 6. Any deviation from this Specification shall be noted in letters a minimum ¼” high. For a deviation to be considered, it must upgrade the quality of the equipment or respond to a field condition.
- B. Before fabrication shall begin, the Fixed Seating Manufacturer shall submit for review an assembled sample of a new fixed chair with construction, fabric, and finishes meeting all requirements set forth in this Specification.
1. Sample shall include the following:
 - a. One complete chair 22” wide
 - b. Row number plate and aisle letter plate installed (no donor plate)
 - c. One aisle standard with aisle light
 - d. One center standard
 - e. Aisle light transformer with plug
 2. In addition to the above, provide as a separate assembly one ADA-compliant aisle standard with aisle light.
 3. Sample chair shall be retained for quality comparison with actual installation.

- C. After installation, Fixed Seating Manufacturer shall provide the Owner with Operations and Maintenance (O&M) Manuals.
 - 1. Provide one printed hard copy manual
 - 2. Provide two flash drives with manual in electronic format
 - 3. Each O&M Manual shall include the following:
 - a. Contact name, phone number, and fax number
 - b. Record shop drawings
 - c. Catalog cuts and complete parts list of installed equipment
 - d. Recommended maintenance procedures
 - e. Fabric manufacturer, product number, color, weight, width, and manufacture date

1.5 MANUFACTURER'S RESPONSIBILITIES

- A. Fixed Seating Manufacturer shall study the Contract Drawings and Specifications with regard to the work as shown and required under this Section to ensure its completeness.
- B. Fixed Seating Manufacturer shall pay particular attention to all architectural and structural drawings relevant to construction of the flooring and substructure of all floor areas that will receive seating.
- C. Fixed Seating Manufacturer shall verify by field measurement all dimensions affecting the work.
 - 1. The approved seating plan shall be reproduced on the floor and dimensions and layout shall be checked against the conditions encountered in the field.
 - 2. Field dimensions that are at variance with those on the approved shop drawings shall be brought to the attention of the Architect. If required, the decision regarding corrective measures shall be obtained before the start of fabrication of the affected items.
- D. Fixed Seating Manufacturer shall examine all surfaces and conditions to which this work shall be attached.
 - 1. Notify the Construction Manager, in advance of commencement of installation, if any conditions or surfaces exist which the Fixed Seating Manufacturers considers detrimental to the proper and expeditious installation of its work.
 - 2. Starting of the installation shall imply acceptance of the surfaces and conditions to perform the work as specified.
- E. Fixed Seating Manufacturer shall cooperate in the coordination and scheduling of the delivery and installation of fixed seating with the Construction Manager and/or General Contractor.
- F. It shall be the responsibility of the Fixed Seating Manufacturer to furnish equipment complete in all respects, including any additional equipment required to fulfill the design intent of these Specifications, regardless of whether such items are herein specified or indicated.

- G. Fixed Seating Manufacturer shall be responsible for verifying that the job conditions are ready to receive work in this Section. Fixed Seating Manufacturer must notify the Construction Manager of any existing conditions that may adversely affect execution of work, so that resolution may be reached before commencement of installation.

1.6 DELIVERY

- A. Delivery and Installation shall be as required in the Contract Documents.
- B. Bid price to include full freight and insurance charges for delivery of equipment to job site.
- C. The approved seating shall be delivered to the job site fully fabricated and ready for installation, in the Fixed Seating Manufacturer's protective packaging.
 - 1. Spare parts and attic stock shall be packaged separately and provided on the last day of installation.
- D. Seating shall not be delivered to the job site until the construction has reached a stage to accept the installation.

1.7 WARRANTY

- A. The Fixed Seating Manufacturer shall assure that equipment is provided free of defects in materials and workmanship and shall provide a warranty agreeing to make all applicable repairs, including replacement of materials, at no cost to the Owner for a minimum of three years from the date of final acceptance.

1.8 FIXED SEATING MANUFACTURER AND MODEL

- A. The Basis of Design Manufacturer for the work of this Section shall be the following:
 - 1. Irwin Seating Co.
Box 2429
3251 Fruit Ridge Road N.W.
Grand Rapids, MI 49501
Contact: Spence Benedict
616-574-7341
spence.benedict@irwingseating.com
 - a. Seat model: TBD
- B. Alternate equivalent manufacturers and products shall be:
 - 1. Series Seating
20900 NE 30th Ave Suite 901
Miami, FL 33180
Contact: Thomas Boyd
574-265-6455
tboyd@seriesseating.com
 - a. Seat model: TBD
 - 2. Hussey Seating
38 Dyer Street Extension

North Berwick, ME 03906
Contact: 800-341-0401
a. Seat model: TBD

PART 2 PRODUCTS

2.1 GENERAL

- A. Fixed seats shall be floor-mounted type with:
1. Wood veneer plywood back with upholstered panel
 2. Plastic $\frac{3}{4}$ fold seat pan with upholstered cushion
 3. Solid hardwood aisle standards
 4. ADA compliant transfer aisle standard (where indicated)
 5. Solid steel middle standard
 6. Warm white LED aisle light mounted to aisle standard (where indicated)
 7. Solid hardwood armrests
 8. Plates for row letters (aisle standard), seat numbers (seat pan), ADA-compliance (aisle standard)

2.2 QUANTITIES

- A. Fixed Seating Manufacturer shall provide new fixed seats in quantities required.
- B. The final determination of the total number of seats of each width cannot be made until the Fixed Seating Manufacturer produces shop drawings for the project based upon accurate field measurements.
- C. Provide chairs in widths of 20", 21", 22", and 23" as shown on the seating layout drawings or required based on field measurements.
- D. At the completion of installation, provide the following 'attic stock' spare parts in separate packing cartons with labels:
1. Two Complete seat backs in each width provided
 2. Two Complete seat pans in each width provided
 3. Four seat back cushion covers in each width provided
 4. Four seat pan cushion covers in each width provided
 5. Two aisle standards, oriented right, with armrest and aisle light
 6. Two aisle standards, oriented left, with armrest and aisle light
 7. One ADA transfer aisle standard, oriented right, with armrest and aisle light
 8. One ADA transfer aisle standard, oriented left, with armrest and aisle light
 9. Four middle standards
 10. Eight armrests for middle standard
 11. One quart of each paint used on metal surfaces
 12. Five yards fabric of each type used.
 - a. Fabric shall be from same dye lot and installed on seats and shall include labels identifying manufacturer, weight, product number, color, and manufacture date.

2.3 MATERIALS

- A. Wood shall be solid white oak hardwood, rift cut, clear finish, open-pore.
- B. Glue used to join all plywood and composite wood components shall have no added urea-formaldehyde and meet the following:
 - 1. ASTM designation D-805-63
 - 2. 20 dry shear test pulls, not less than 300 lbs per square inch
 - 3. 10 wet shear test pulls after forty-eight hour immersion, not less than 200 lbs per square inch
- C. Finishes
 - 1. Wood Surfaces
 - a. Wood parts stain finish shall match Architect's control sample.
 - b. All exposed wood surfaces shall be coated with a lacquer of sufficient film depth to afford adequate protection in use.
 - 2. Metal Surfaces
 - a. All metal surfaces shall be painted black.
 - b. Metal parts shall be cleaned with hot alkyd spray and hot water rinse and the iron phosphate treated before finishing with powdered epoxy paint in color selected by Architect. Cured powder coating shall meet or exceed the following requirements:
 - i. Dry Film Thickness: Average coating of 2 mils as per ASTM-D-1400-81.
 - ii. Hardness (Pencil): Assure an H pencil hardness as per ASTM-D-3363-74.
 - iii. Abrasion: Taber/Abraser Test to assure a maximum of 60 mg weight loss to the tested part after 1,000 cycles with a CS-10 wheel weighing 1,000 grams.
 - c. Painted parts shall be gas oven baked after application of base color at a minimum of 350 degrees Fahrenheit for twenty minutes to assure an even, smooth and fully cured finish. Additional detail paint requirements in Section 2.4-A.
- D. Upholstery Fabric
 - 1. For seat back cushion cover: Refer [Section 099900](#) to Finish Color Schedule
 - 2. For seat pan cushion cover: Refer [Section 099900](#) to Finish Color Schedule
- E. Padding
 - 1. Foam padding shall be of cold-cure polyurethane foam.
 - 2. Padding material shall comply with the flammability requirements outlined in California Technical Information Bulletin #17 Resilient Cellular Materials, Section A & D, dated 2/75, when tested in accordance with Federal Test Method Standard 191, Method 5903.2.

2.4 CONSTRUCTION DETAILS

- A. Aisle Standards
 - 1. Full-height, panel extends to floor
 - 2. Constructed of solid hardwood 2" thick
 - 3. Hardwood edging at all sides

4. Recess for row letter plate at aisle side of panel
5. Configured for aisle light within armrest
6. Designed to properly support the adjacent seat at the correct height and pitch
7. Provided with lugs for attachment of aisle standard armrests
8. Metal foot for floor mounting. Foot shall allow for attachment to the floor and for severe tightening and shock without fracture.
9. No visible fasteners
10. Wood veneer per [Section 099900](#)-Finish Color Schedule

B. ADA-compliant swing-out aisle standards

1. Same as above, with swing-out panel to accommodate ADA transfer
2. Recess for ADA plate at aisle side of panel

C. Seat Back

1. 0.75" Thickness
2. Hardwood edging at all sides
3. Foam cushion with fabric cover, fabric selection by Architect. No visible stitching or decorative channel.
4. Back Pitch: TBD
5. No visible fasteners
6. Bottom edge of the panel shall be aligned with the lowest point of the seat bottom in its raised position.
7. Same width as seat bottom so that spaces between adjacent backs are consistent.
8. Wood veneer per [Section 099900](#)-Finish Color Schedule

D. Seat Pan – Fixed Seats

1. Molded plastic; Custom gray to match Architect's control sample
2. Foam cushion with fabric cover per [Section 099900](#)-Finish Color Schedule.
3. No visible fasteners
4. When unoccupied, the seat shall automatically rise to a ¾ fold position, and with rearward pressure shall achieve full fold position.

E. Seat Pan – Jump Seats

1. Plywood and wood veneer per [Section 099900](#)-Finish Color Schedule
2. Foam cushion with fabric cover per [Section 099900](#)-Finish Color Schedule.
3. No visible fasteners
4. When unoccupied, the seat shall automatically rise to fully fold position.

F. Armrest

1. Solid hardwood construction
2. Flat top and rounded corners
3. Recess for aisle light
4. No visible fasteners
5. Stain color per [Section 099900](#)-Finish Color Schedule

G. Aisle Light

1. Low-voltage Warm White (2700K-3000K) LED linear source
2. Recessed into grooved channel at the underside of aisle standard armrests

3. Provides sufficient beam spread and intensity to meet code required minimum foot candle level in path of egress
4. Aisle light shall be properly grounded and pre-wired with conductors enclosed in a minimum 3/8" diameter flexible steel conduit extending a minimum of 18" beyond the foot of the aisle standard.
 - a. Wiring shall be provided with a 90-degree angle connector
5. Provide adequately sized transformer housed in a steel enclosure and equipped with primary and secondary fuses or circuit breakers, terminal blocks, and safety disconnect.
6. Provide instructions and details for termination by Electrical Contractor.

H. Seat Number and Row Letter Plates

1. Text color and typeface to be confirmed by Architect.
2. Plate finish and dimensions to be confirmed by Architect.

PART 3 – EXECUTION

3.1 GENERAL

- A. Installation shall be supervised by the Fixed Seating Manufacturer's own experienced superintendent in strict conformance with the approved seating layout shop drawings.
 1. The same individual shall remain in charge throughout the installation.
 2. The superintendent shall represent the Fixed Seating Manufacturer and all directions given to the superintendent shall be binding as if given to the Fixed Seating Manufacturer.
- B. Fixed Seating Manufacturer shall be responsible for storage of tools, equipment, and materials during the period of the installation.

3.2 INSTALLATION

- A. Standards shall be anchored to concrete using two bolts and anchors per standard.
- B. Properly sized fasteners shall be used. Breaking off oversized bolts on seat pan and seat back connections shall not be permitted.
 1. Cap nuts shall be used on bolts connecting back wings to standards.
- C. Aisle lights shall be installed in designated locations.
- D. All seating shall be securely installed in designated locations, shall be rigid, plumb, accurately aligned, and neatly executed.
- E. All movable parts shall operate smoothly and quietly, and all seats, when not occupied, shall be upright and at the same angle.
- F. The backs and the seats (in upright position) shall be neatly aligned.
- G. Prior to acceptance, each seat shall be tested and inspected to assure the following:
 1. Each seat is working properly.

2. Number and letter plates are securely fastened in place without raised or jagged edges.
3. Applied finishes are free from scratches or abrasions.
4. Seat functions properly with unoccupied seat bottom automatically returning to the 3/4 folded position.
5. Seat and row identification plates are correct.

3.3 PROTECTION AND CLEANING

- A. Fixed Seating Manufacturer shall protect installed seating by carefully covering the seats with 4 MIL plastic sheets secured at corners to prevent damage to the installed work.
- B. Damages that do occur to the fixed seats shall be repaired and/or replaced as directed by the Owner and/or the Architect at no additional cost to the Owner.
- C. Fixed Seating Manufacturer shall provide barriers as required to protect the surfaces or equipment provided by other contractors from damage during the seat installation.
- D. At completion of installation, surfaces and materials of the fixed seating shall be cleaned of debris, dirt, and foreign materials.
- E. The Fixed Seating Manufacturer shall be responsible for cleanup, including removal of packing materials from job site etc. and the protection of surfaces or equipment provided by other contractors.

END OF SECTION 126113

SECTION 144200 - LIFTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Vertical platform lifts in configurations and locations indicated in Drawings.
- B. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
 - 2. Section 042000 "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry.

1.3 DEFINITIONS

- A. Definitions in ASME A18.1 apply to Work of this Section.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components, and finishes for lifts.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, safety features, controls, finishes, and accessories.
- B. Sustainable Design Submittals:
 - 1. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For each lift.
 - 1. Include plans, elevations, sections, attachment details, and required clearances.
 - 2. Indicate dimensions, weights, loads, and points of load to building structure.
 - 3. Include details of equipment assemblies, method of field assembly, components, and location and size of each field connection.
 - 4. Include diagrams for power, signal, and control wiring.

- D. Samples for Initial Selection: For surfaces and components with factory-applied color finishes.
 - 1. Include Samples of integrally colored materials and accessories involving color selection.
- E. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Metal Finish: Manufacturer's standard-size unit, not less than 3 inches square.
 - 2. Tubular Products and Running Trim: Manufacturer's standard-size unit, 6 inches long.
 - 3. Glass and Glazing: Units 12 inches square.
 - 4. Hardware: Manufacturer's standard, exposed, door-operating device.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of lift.
 - 1. Include statement that runway, ramp or pit, dimensions as shown on Drawings, and electrical service as shown and specified are adequate for lift being provided.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lift to include in operation and maintenance manuals.
 - 1. Include the following:
 - a. Parts list with sources indicated.
 - b. Recommended parts inventory list.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted use of lifts.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the ABA standards of the governmental agency having jurisdiction.

- B. Regulatory Requirements: Comply with ASME A18.1, "Safety Standard for Platform Lifts and Stairway Chairlifts."

2.2 VERTICAL PLATFORM LIFT

- A. Vertical Platform Lift, General: Pre-engineered lift systems in locations indicated in Drawings.
 - 1. Basis of Design: Subject to compliance with requirements, provide Savaria Lift, Model V1504 or comparable product by one of the following manufacturers:
 - a. Garaventa Lifts.
 - b. Butler Dynamics, LLC.
 - c. Inclinator Company of America.
 - d. Liftavator.
 - e. Arrow Lift.
- B. Number of Stops: As indicated on Drawings.
- C. Platform Size: As indicated on Drawings.
- D. Door Operation and Clear Opening Width: Low-energy, power-operated doors that remain open for 20 seconds minimum; end door with minimum 32-inch and side door with minimum 42-inch clear opening width.
- E. Rated Speed: 8 fpm or as required for application.
- F. Power Supply: Refer to Electrical.
- G. Emergency Operation: Provide manual operation to raise or lower unit to a landing in case of malfunction or power loss.
- H. Self-Supporting Unit: Support vertical loads of unit only at base, with lateral support only at landing levels.
- I. Runway Enclosure: Manufacturer's standard enclosure assembly for application as indicated on Drawings.
- J. Platform: Steel sheet or galvanized-steel sheet with manufacturer's standard black rubber flooring.
- K. Platform Enclosure and Door: Rectangular steel-tube frame with flush steel-sheet panels.
- L. Ramp: Retractable ramp matching platform to provide transition from lower floor to lift platform. Ramp lowers to floor automatically when lifts reach lower landing and door opens. Ramp rises automatically when lift control is activated for lift to leave lower landing.
 - 1. Ramp Size: End ramps a minimum of 32 inches wide; length as required for slope.
 - 2. Ramp Slope: As indicated, maximum 1:12.
 - 3. Ramp Finish: Finish ramps to match lift platform.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500/A 500M.
- C. Steel Pipe: ASTM A 53/A 53M; standard weight (Schedule 40) unless otherwise indicated or required by loads.
- D. Steel Sheet: ASTM A 1008/A 1008M, cold-rolled commercial steel (CS) or ASTM A 1011/A 1011M hot-rolled, commercial steel (CS); as required for each use.
- E. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 zinc coating.
- F. Galvanizing: Hot-dip galvanize items complying with the following:
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- G. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; manufacturer's standard strengths and thicknesses for type of use.
 - 1. Extruded Aluminum: ASTM B 221.
 - 2. Aluminum Sheet and Plate: ASTM B 209.
- H. Stainless-Steel Bars and Shapes: ASTM A 276/A 276M, Type 304.
- I. Stainless-Steel Tubing: ASTM A 554, Grade MT-304.
- J. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- K. Stainless-Steel Floor Plate: ASTM A 793.
- L. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing structural members, guide rails, machines, and other lift components where installation of devices is specified in another Section.
- M. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 FASTENERS

- A. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, as appropriate for the substrate.
 - 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. Material for where Stainless Steel Is Indicated: Alloy Group 1 (A1) or Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 FINISHES

- A. Steel and Galvanized-Steel Factory Finish:
 1. Baked-Enamel or Powder-Coat Finish: Clean, pretreat, and apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat with a minimum dry film thickness of 1 mil for topcoat.
 2. Color and Gloss: As selected by Architect from manufacturer's full range.
- B. Stainless-Steel Finishes:
 1. Grab Rail Finish: Directional satin finish No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, critical dimensions, and other conditions affecting performance of the Work.
- B. Minimum Headroom Clearance: Verify that installed lift will have a minimum headroom of 80 inches above any point on platform floor at any point of travel.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with ASME A18.1 and manufacturer's written instructions for installation of lifts unless otherwise indicated.

- B. Wiring Method: Conceal conductors and cables within housings of units or building construction. Do not install conduit exposed to view in finished spaces. Bundle, lace, and route conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
- C. Coordinate runway doors with platform travel and positioning, for accurate alignment and minimum clearance between platforms, runway doors, sills, and door frames.
- D. Position sills accurately and fill space under sills solidly with nonshrink, nonmetallic grout.
- E. Coordinate platform doors with platform travel and positioning.
- F. Adjust stops for accurate stopping and leveling at each landing, within required tolerances.
 - 1. Leveling Tolerance: 1/4 inch up or down, regardless of load and direction of travel.
- G. Adjust retractable ramps to meet maximum allowable slope and change-in-elevation requirements, and to lie fully against landing surfaces.
- H. Lubricate operating parts of lift, including drive mechanism, guide rails, hinges, safety devices, and hardware.
- I. Test safety devices and verify smoothness of required protective enclosures and other surfaces.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of lift installation and before permitting use of lifts, perform acceptance tests as required and recommended by ASME A18.1 and authorities having jurisdiction.
- B. Operating Test: In addition to acceptance testing, load lifts to rated capacity and operate continuously for 30 minutes between lowest and highest landings served. Readjust stops, signal equipment, and other devices for accurate stopping and operation of system.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on lifts.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lifts. Include a review of emergency systems and emergency procedures to be followed at time of operational failure and other building emergencies.
- B. Check operation of lifts with Owner's personnel present and before date of Substantial Completion. Determine that operating systems and devices are functioning properly.
- C. Check operation of lifts with Owner's personnel present not more than one month before end of warranty period. Determine that operating systems and devices are functioning properly.

END OF SECTION 144200