

PROJECT MANUAL

including Specifications
for construction of

**Chabad Downtown
30 Wall Street
Binghamton, NY 13901**

Prepared by: **Fifield Piaker Elman Architects PC**
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New York, NY, 10003
212.979.9272

Date: Issued 9/19/2025

TABLE OF CONTENTSDIVISION 00 SUPPLEMENTAL

Section	001116	Invitation to Bid
	002113	Instructions to Bidders
	002213	Supplemental Instructions to Bidders
	002313	A701-2018 Instructions to Bidders
	004113	Bid Form
	004313	Bid Security Forms

DIVISION 01 GENERAL REQUIREMENTS

Section	011000	Summary
	012000	Price and Payment Procedures
	012500	Substitution Procedures
	013000	Administrative Requirements
	013233	Photographic Documentation
	016000	Product Requirements
	017000	Execution and Closeout Requirements
	017710	Punchlist

DIVISION 02 EXISTING CONDITIONS

Section	024119	Selective Demolition
---------	--------	----------------------

DIVISION 03 CONCRETE (Refer to Engineering Drawings)DIVISION 04 MASONRY (Refer to Engineering Drawings)DIVISION 05 METALS

Section	054000	Cold Formed Metal Framing
	055113	Metal Pan Stairs
	055200	Metal Railings

DIVISION 06 WOOD

Section	061000	Rough Carpentry
	061600	Sheathing

DIVISION 07 THERMAL AND MOISTURE PROTECTION

Section	071326	Self Adhering Sheet Waterproofing
	071410	Cold Fluid Applied Waterproofing
	072100	Thermal Insulation
	074243	Composite Wall Panels
	075400	TPO Single Ply Roofing Membrane
	076200	Sheet Metal Flashing and Trim
	079200	Joint Sealants

DIVISION 08 OPENINGS

Section	081113	Hollow Metal Doors and Frames
	084113	Aluminum Framed Entrances and Storefronts
	085113	Aluminum Windows
	088000	Glazing

DIVISION 09 FINISHES

Section	092900	Gypsum Board
	093000	Large Format Porcelain Tiling
	093013	Ceramic Tiling
	095113	Acoustic Panel Ceilings
	096513	Resilient Base and Accessories
	096519	Resilient Tile Flooring
	097200	Wall Covering
	099113	Exterior Painting
	099123	Interior Painting

DIVISION 10 SPECIALTIES

Section	102226	Operable Partitions
---------	--------	---------------------

DIVISION 11 EQUIPMENT (Not Used)DIVISION 12 FURNISHINGS

Section	123661.19	Quartz Agglomerate Countertops
---------	-----------	--------------------------------

DIVISION 13 SPECIAL CONSTRUCTION (Not Used)DIVISION 14 CONVEYING EQUIPMENT (Not Used)DIVISION 21 FIRE SUPPRESSION (Refer to Engineering Drawings)DIVISION 22 PLUMBING (Refer to Engineering Drawings)DIVISION 23 HEATING, VENTILATING, AIR CONDITIONING (Refer to Engineering Drawings)DIVISION 26 ELECTRICAL (Refer to Engineering Drawings)DIVISION 32 EXTERIOR IMPROVEMENTS (Refer to Engineering Drawings)

END OF TABLE OF CONTENTS

DOCUMENT 001116 - INVITATION TO BID

1.1 PROJECT INFORMATION

- A. Notice to Bidders: Prequalified bidders are invited to submit bids for the Project as described in this Document according to the Instructions to Bidders.
- B. Project Identification: Chabad Downtown, FPE Project #2022037.00.
1. Project Location: 30 Wall Street, Binghamton, NY 13901
 2. Owner:
The Rohr Chabad Center for Jewish Student Life at Binghamton University
420 Murray Hill Rd.
Vestal, NY 13850
T (607) 797-0015 ex204
 3. Architect:
Fifield Piaker Elman Architects, P.C. (FPE)
740 Broadway Suite 601
New York, New York 10003
T (212) 979-9272
 4. Interior Designer:
HH Designers
1876 Lakewood Rd. Unit 7
Toms River, NJ 08755
T (732) 400-5538
 5. Structural Engineer:
Structural Consulting Services. P.C.
67 Federal Road, Bldg A
Brookfield, CT 06804
T (203) 740-7578
 6. MEPFP Engineer:
Avcon Engineering PC
580 8th Avenue, 14th Floor
New York, NY 10018
T (646) 572-0488
 7. Lighting Consultant:
Consumer's Lighting and Lamps
23 Washington Ave., Suite 1
Suffern, NY 10901
T (845) 533-1622 ext 110

8. Civil Engineer:
Keystone Associates
58 Exchange Street
Binghamton, NY 13901
T (607) 722-1100
9. Mikvah Consultant:
Mikvah Design & Consultancy
1816 Rome Avenue
Saint Paul, MN 55116
T (651) 690-4867
10. Kitchen Consultant:
Welsh Restaurant Equipment
20 Broad Street
Binghamton, NY 13904
T (732) 400-5538
11. Design Consultant:
Uriel Zohar Design Studio
T (972) 54-793-9506

C. Project Description: The Work consists of selected interior and exterior renovations and sitework at the existing two-story commercial building located at 30 Wall Street, Binghamton, NY.

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

1. General Contract (all trades).

1.2 BID SUBMITTAL AND OPENING

A. Owner will receive sealed bids until the bid time and date at the location indicated below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:

1. Bid Date: **Thursday, 11/6/2025.**
2. Bid Time: 2:00 pm, local time.
3. Location:

Rabbi Levi Slonim

The Rohr Chabad Center for Jewish Student Life at Binghamton University
420 Murray Hill Rd.
Vestal, NY 13850

Bids will be thereafter privately opened.

1.3 PREBID CONFERENCE

A. A prebid conference for all bidders will be held at **30 Wall Street, Binghamton, NY** on

Thursday, 10/16/2025 at 1:00 p.m., local time. Prospective bidders are required to attend.

1.4 DOCUMENTS

- A. Online Procurement and Contracting Documents: Bid Documents will be provided in PDF format via email by the Architect.
- B. Bid Documents shall be provided to prime bidders only.

1.5 CONTRACT AWARD

- A. The anticipated contract award date is on or about **12/6/2025**.

1.6 CONTRACT TIME AND SUBSTANTIAL COMPLETION

- A. The anticipated Contract Time for Substantial Completion is **Two Hundred Sixty (260) Working Days**.

1.7 TIME OF COMPLETION AND LIQUIDATED DAMAGES

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

1.8 BIDDER'S QUALIFICATIONS

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

END OF DOCUMENT 001116

1.1 INSTRUCTIONS TO BIDDERS

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

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

END OF DOCUMENT 002113

DOCUMENT 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."
 - 2. The following Supplementary Instructions to Bidders that modify and add to the requirements of the Instructions to Bidders.

1.2 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS, GENERAL

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

1.3 ARTICLE 2 - BIDDER'S REPRESENTATIONS

- A. Add Section 2.1.3.1:
 - 1. 2.1.3.1 - The Bidder has investigated all required fees, permits, and regulatory requirements of authorities having jurisdiction and has properly included in the submitted bid the cost of such fees, permits, and requirements not otherwise indicated as provided by Owner.
- B. Add Section 2.1.5:
 - 1. 2.1.5 - The Bidder is a properly licensed Contractor according to the laws and regulations of Binghamton, NY and meets qualifications indicated in the Procurement and Contracting Documents.
- C. Add Section 2.1.6:
 - 1. 2.1.6 - The Bidder has incorporated into the Bid adequate sums for work performed by installers whose qualifications meet those indicated in the Procurement and Contracting Documents.

1.4 ARTICLE 3 - BIDDING DOCUMENTS

- A. 3.2 - Interpretation or Correction of Procurement and Contracting Documents:
 - 1. Add Section 3.2.2.1:
 - a. 3.2.2.1 - Submit Bidder's Requests for Interpretation submitted via email.
- B. 3.4 - Addenda:

1. Delete Section 3.4.3 and replace with the following:
 - a. 3.4.3 - Addenda may be issued at any time prior to the receipt of bids.
2. Add Section 3.4.4.1:
 - a. 3.4.4.1 - Owner may elect to waive the requirement for acknowledging receipt of 3.4.4 Addenda as follows:
 - 1) 3.4.4.1.1 - Information received as part of the Bid indicates that the Bid, as submitted, reflects modifications to the Procurement and Contracting Documents included in an unacknowledged Addendum.
 - 2) 3.4.4.1.2 - Modifications to the Procurement and Contracting Documents in an unacknowledged Addendum do not, in the opinion of Owner, affect the Contract Sum or Contract Time.

1.5 ARTICLE 4 - BIDDING PROCEDURES

A. 4.1 - Preparation of Bids:

1. Add Section 4.1.1.1:
 - a. 4.1.1.1 - Printable electronic Bid Forms and related documents are available from **Architect**.
2. Add Section 4.1.8:
 - a. 4.1.8 - The Bid shall include unit prices when called for by the Procurement and Contracting Documents. Owner may elect to consider unit prices in the determination of award. Unit prices will be incorporated into the Contract.
3. Add Section 4.1.9:
 - a. 4.1.9 - Owner may elect to disqualify a bid due to failure to submit a bid in the form requested, failure to bid requested alternates or unit prices, failure to complete entries in all blanks in the Bid Form, or inclusion by the Bidder of any alternates, conditions, limitations or provisions not called for.
4. Add Section 4.1.10:
 - a. 4.1.10 - Bids shall include sales and use taxes. Contractors shall show separately with each monthly payment application the sales and use taxes paid by them and their subcontractors in the form indicated. Reimbursement of sales and use taxes, if any, shall be applied for by Owner for the sole benefit of Owner.

B. 4.3 - Submission of Bids:

1. Add Section 4.3.1.2:
 - a. 4.3.1.2 - Include Bidder's Contractor License Number applicable in Project jurisdiction on the face of the sealed bid envelope.

C. 4.4 - Modification or Withdrawal of Bids:

1. Add the following sections to 4.4.2:

- a. 4.4.2.1 - Such modifications to or withdrawal of a bid may only be made by persons authorized to act on behalf of the Bidder. Authorized persons are those so identified in the Bidder's corporate bylaws, specifically empowered by the Bidder's charter or similar legally binding document acceptable to Owner, or by a power of attorney, signed and dated, describing the scope and limitations of the power of attorney. Make such documentation available to Owner at the time of seeking modifications or withdrawal of the Bid.
- b. 4.4.2.2 - Owner will consider modifications to a bid written on the sealed bid envelope by authorized persons when such modifications comply with the following: the modification is indicated by a percent or stated amount to be added to or deducted from the Bid; the amount of the Bid itself is not made known by the modification; a signature of the authorized person, along with the time and date of the modification, accompanies the modification. Completion of an unsealed bid form, awaiting final figures from the Bidder, does not require power of attorney due to the evidenced authorization of the Bidder implied by the circumstance of the completion and delivery of the Bid.

D. 4.5 - Break-Out Pricing Bid Supplement:

1. Add Section 4.5:

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

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

1. Add Section 4.6:

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

1.6 ARTICLE 5 - CONSIDERATION OF BIDS

A. 5.2 - Rejection of Bids:

1. Add Section 5.2.1:

- a. 5.2.1 - Owner reserves the right to reject a bid based on Owner's and Architect's evaluation of qualification information submitted following opening of bids. Owner's evaluation of the Bidder's qualifications will include: status of licensure and record of compliance with licensing requirements, record of quality of completed work, record of Project completion and ability to complete, record of financial management including financial resources available to complete Project

and record of timely payment of obligations, record of Project site management including compliance with requirements of authorities having jurisdiction, record of and number of current claims and disputes and the status of their resolution, and qualifications of the Bidder's proposed Project staff and proposed subcontractors.

1.7 ARTICLE 6 - POSTBID INFORMATION

A. 6.1 - Contractor's Qualification Statement:

1. Add Section 6.1.1:

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

B. 6.3 - Submittals:

1. Add Section 6.3.1.4:

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

1.8 ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

A. 7.1 - Bond Requirements:

1. Add Section 7.1.1.1:

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

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

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

- a. The Bidder shall deliver the required bonds to Owner no later than **10** days after the date of Notice of Intent to Award and no later than the date of execution of the Contract, whichever occurs first. Owner may deem the failure of the Bidder to deliver required bonds within the period of time allowed a default.

2. Delete Section 7.2.3 and insert the following:

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

1.9 ARTICLE 8 - FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

A. **A101-2017 – Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum.**

1.10 ARTICLE 9 - EXECUTION OF THE CONTRACT

A. Add Article 9:

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

END OF DOCUMENT 002213

DRAFT AIA® Document A701® – 2018

Instructions to Bidders

for the following Project:

(Name, location, and detailed description)

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

THE OWNER:

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

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<< >>

THE ARCHITECT:

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

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TABLE OF ARTICLES

- | | |
|---|--|
| 1 | DEFINITIONS |
| 2 | BIDDER'S REPRESENTATIONS |
| 3 | BIDDING DOCUMENTS |
| 4 | BIDDING PROCEDURES |
| 5 | CONSIDERATION OF BIDS |
| 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.

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.



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ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

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

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

« »

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper

documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

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

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

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

§ 3.2 Modification or Interpretation of Bidding Documents

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

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

« »

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

§ 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2 Substitution Process

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

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

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

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

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

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

§ 3.4 Addenda

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

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

« »

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

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

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

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

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

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

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

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

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

§ 4.2 Bid Security

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

(Insert the form and amount of bid security.)

« »

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

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

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

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:

(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

« »

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

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

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

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

§ 4.4 Modification or Withdrawal of Bid

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

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

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

(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

« »

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

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

§ 5.2 Rejection of Bids

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

§ 5.3 Acceptance of Bid (Award)

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

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

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

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

§ 6.2 Owner's Financial Capability

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

§ 6.3 Submittals

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

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

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

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

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

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

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

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

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

<< >>

§ 7.2 Time of Delivery and Form of Bonds

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

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

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

- 1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)

<< >>

- 2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)

<< >>

- 3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.

(Insert the complete AIA Document number, including year, and Document title.)

<< >>

- 4 Building Information Modeling Exhibit, if completed:

<< >>

- 5 Drawings

Number

Title

Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda:

Number	Date	Pages

.8 Other Exhibits:

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

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

☐ ☐

[☐] The Sustainability Plan:

Title	Date	Pages

[☐] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

.9 Other documents listed below:

(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

☐ ☐

From: _____
(signature & date)

(name & title)

(name of firm)

(address line 1)

(address line 2)

(phone & fax #)

(e-mail address)

Date:

To:

Chabad of Binghamton
420 Murray Hill Road
Vestal, NY 13850
Attn: Rabbi Levi Slonim (607) 797-0015

Project: Chabad Downtown – 30 Wall Street, Binghamton, NY 13901
Project No: FPE reference #2022037.00

Dear Sir:

Having fully examined the Project Manual and Construction Drawings and Specifications for the above-referenced project, the undersigned hereby submits the following all-inclusive, guaranteed maximum price proposal for providing all the labor and materials and doing all the things necessary for the satisfactory completion of the scope of work in accordance with said documents and under one all-encompassing contract.

ACKNOWLEDGEMENT OF ADDENDA

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 _____.

PROPOSAL – BASE BID

\$

PROPOSAL – CONTRACT TIME DURATION

(**TOTAL PROJECT DURATION**) Number of calendar days to complete all base bid work quoted above. Also to be provided with base bid is the summary schedule of construction.)

ATTACHMENT “A”

Category Number	Trade/Description	COST	COMMENTS
013266	Photographic Documentation		
024119	Selective Demolition		
033000	Concrete		
042200	Concrete Unit Masonry		
051200	Structural Steel		
053100	Steel Decking		
054000	Cold Formed Metal Framing		
055000	Metal Stairs		
057313	Glazed Decorative Metal Railings		
061000	Rough Carpentry		
064100	Cabinet Millwork		**To Be Procured by Others
064200	Wood Paneling		
071300	Waterproofing		
072100	Thermal Insulation		
074243	Composite Wall Panels		
074616	Aluminum Siding		
075000	Roofing Including Flashing and Trim		
078000	Firestopping		
079200	Joint Sealants		
081103	Hollow Metal Doors and Frames		
081400	Wood Doors		
083113	Access Doors and Frames		
084113	Aluminum Framed Entrances and Storefronts		
085113	Aluminum Windows		
087100	Door Hardware		
088000	Interior Glazing		
092900	Gypsum Board Assemblies		
093000	Ceramic and Porcelain Tiling		**To Be Procured by Others
095123	Acoustic Tile Ceilings		
096400	Wood Flooring		
096500	Resilient Flooring and Base		
096514	Concrete Finish Flooring		
096813	Tile Carpeting		**To Be Procured by Others
097200	Wall Coverings		**To Be Procured by Others
099113	Exterior Painting		
099123	Interior Painting		
101419	Exterior Signage		
101423	Room Identification Signage		

102113	Toilet Compartments		
102226	Operable Partitions		
102800	Bath Accessories		
111136	Vehicle Charging Equipment		
113013	Residential Appliances		**To Be Procured by Others
114000	Foodservice Equipment		**To Be Procured by Others
120000	FFE		**To Be Procured by Others
123600	Countertops		**To Be Procured by Others
210000	Fire Suppression		
220000	Plumbing		
224000	Plumbing Fixtures		
230000	HVAC		
260000	Electrical		
265100	Light Fixtures		**To Be Procured by Others
310000	Earthwork		
321200	Asphalt Paving and Markings		
321300	Concrete Paving, Sidewalks and Curbs		
329200	Turf and Grasses		
329300	Plants		
	Bid Bond		
	Performance and Payment Bond		
	Miscellaneous (please list)		
	SUBTOTAL		
	% General Conditions*		
	SUBTOTAL		
	% Insurance*		
	SUBTOTAL		
	% Contractors Fees*		
	TOTAL		

***Note: This proposal acknowledges that the foregoing percentages will also be applied to change orders, if any, and/or any additions/deletions to work scope that may arise.**

**** Note: For items “To Be Procured By Others”, General Contractor shall be responsible for coordination, receiving deliveries, installation, assembly, and disposal of packaging/crates etc.**

ATTACHMENT “B”**ALTERNATE PRICES**

Note: This cost breakout summary sheet is intended to identify the prices that may be added and/or deducted from the base bid if elected by Tenant.

<u>ALTERNATE PRICES #</u>	<u>DESCRIPTION</u>	<u>COST</u>
Alt. 1 (Add/Deduct)		
Alt. 2 (Add/Deduct)		
Alt. 3 (Add/Deduct)		
Alt. 4 (Add/Deduct)		
Alt. 5 (Add/Deduct)		

SUBMISSION OF BID

Respectfully submitted this ____ day of _____, 2025.

Submitted By: _____ (Name of bidding firm or corporation).

Authorized Signature: _____.

Signed By: _____ (Type or print name).

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

Street Address: _____.

City, State, Zip: _____.

Phone: _____.

License No.: _____.

Federal ID No.: _____ (Affix Corporate Seal Here).

1.1 BID FORM SUPPLEMENT

- A. A completed bid bond form is required to be attached to the Bid Form.

1.2 BID BOND FORM

- A. AIA Document A310-2010 "Bid Bond" is the recommended form for a bid bond. A bid bond acceptable to Owner, or other bid security as described in the Instructions to Bidders, is required to be attached to the Bid Form as a supplement.
- B. Copies of AIA standard forms may be obtained from The American Institute of Architects; <https://www.aiacontracts.org/>; email: docspurchases@aia.org; (800) 942-7732.

END OF DOCUMENT 004313

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 PROJECT INFORMATION

- A. Project Identification: Chabad Downtown Project.
 - 1. Project Location: 30 Wall Street, Binghamton, NY 13901.
- B. Owner: Chabad of Binghamton.
- C. Architect: Fifield Piaker Elman Architects P.C.
- D. The Work consists of selected interior and exterior renovations and sitework at the existing two-story commercial building located at 30 Wall Street, Binghamton, NY.

1.2 WORK RESTRICTIONS

- A. Contractor's Use of Premises: During construction, Contractor will have limited use of space indicated. Contractor's use of premises is limited only by Owner's right to perform work or employ other contractors on portions of Project and as follows:
 - 1. Owner's second floor tenant will occupy premises during construction. Perform construction during normal working hours (8:00 AM to 5:00 PM Monday thru Friday, other than holidays), unless otherwise agreed to in advance by Owner. Clean up work areas and return to usable condition at the end of each work period.
 - 2. Sidewalks, Walkways, and Entrances: Keep sidewalks and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 8:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
 - 1. Weekend Hours: only per building management's requirements.
 - 2. Early Morning Hours: only per building management's requirements and as permitted by the Binghamton Department of Buildings.
- C. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012000 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 ALLOWANCES

- A. Advise Architect of the date when selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.
- D. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- E. 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.
- F. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.2 UNIT PRICES

- A. Unit price is 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.
- B. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- C. Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

1.3 ALTERNATES

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. 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 alternate into the Work. No other adjustments are made to the Contract Sum.
- B. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- C. Notification: Immediately following award of the Contract, notify each party involved, in writing, whether alternates have been accepted, rejected, or deferred for later consideration.

1.4 PAYMENT PROCEDURES

- A. Comply with all Owner requirements regarding payment procedures.
- B. Submit a Schedule of Values at least seven days before the initial Application for Payment. Break down the Contract Sum into at least one line item for each Specification Section in the Project Manual table of contents. Coordinate the schedule of values with Contractor's construction schedule.
1. Arrange schedule of values consistent with format of AIA Document G703.
 2. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 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.
 4. Provide separate line items in the schedule of values for initial cost of materials and for total installed value of that part of the Work.
 5. Provide a separate line item in the schedule of values for each allowance.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D. Submit three copies of each application for payment according to the schedule established in Owner/Contractor Agreement.
1. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor.
 2. With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 3. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.

- a. Include insurance certificates, proof that taxes, fees, and similar obligations were paid, and evidence that claims have been settled.
- b. Include affidavit of payment of debts and claims on AIA Document G706.
- c. Include affidavit of release of liens on AIA Document G706A.
- d. Submit final meter readings for utilities, a record of stored fuel, and similar data as of the date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUBSTITUTION PROCEDURES

- A. Substitutions include changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A or other agreed upon form.
 - 2. Identify product to be replaced and show compliance with requirements for substitutions. Include a detailed comparison of significant qualities of proposed substitution with those of the Work specified, a list of changes needed to other parts of the Work required to accommodate proposed substitution, and any proposed changes in the Contract Sum or the Contract Time should the substitution be accepted.
- C. Architect will review proposed substitutions and notify Contractor of their acceptance or rejection by Change Order. If necessary, Architect will request additional information or documentation for evaluation.
- D. **Do not** submit unapproved substitutions on Shop Drawings or other submittals.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 013000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

- A. Subcontract List: Submit a written summary identifying individuals or firms proposed for each portion of the Work.
- B. Key Personnel Names: Within 5 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. List e-mail addresses and telephone numbers.
- C. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.
- D. Requests for Information (RFIs): On discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. Use AIA Document G716
- E. Schedule and conduct progress meetings at Project site at regular intervals. Notify Owner and Architect of meeting dates and times. Require attendance of each subcontractor or other entity concerned with current progress or involved in planning, coordination, or performance of future activities.
 - 1. General Contractor minutes and distribute to everyone concerned, including Owner and Architect.

1.2 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 - 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Contractor shall execute a data licensing agreement in the form of Agreement form supplied by the Architect].
- B. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 1. 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.
 - 2. Submit three copies of each action submittal. Architect will return two copies.
 - 3. Submit two copies of each informational submittal. Architect will not return copies.

4. Architect will discard submittals received from sources other than Contractor.
- C. Electronic Submittals: Identify and incorporate information in each electronic submittal file 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 unique identifier, including project identifier, Specification Section number, and revision identifier.
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
- D. Identify options requiring selection by Architect.
- E. Identify deviations from the Contract Documents on submittals.
- F. Contractor's Construction Schedule Submittal Procedure:
1. Submit required submittals in the following format:
 - a. Working electronic copy of schedule file, where indicated.
 - b. PDF electronic file.
 2. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - a. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
 3. 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.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections.
1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2.2 ACTION SUBMITTALS

- A. Product Data: Mark each copy to show applicable products and options. Include the following:
1. Manufacturer's written recommendations, product specifications, and installation instructions.
 2. Wiring diagrams showing factory-installed wiring.
 3. Printed performance curves and operational range diagrams.
 4. Testing by recognized testing agency.
 5. Compliance with specified standards and requirements.
- 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. Submit on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 42 inches (762 by 1067 mm). Include the following:
1. Dimensions and identification of products.
 2. Fabrication and installation drawings and roughing-in and setting diagrams.
 3. Wiring diagrams showing field-installed wiring.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurement.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture and for a comparison of these characteristics between submittal and actual component as delivered and installed. Include name of manufacturer and product name on label.
1. If variation is inherent in material or product, submit at least [three] <Insert number> sets of paired units that show variations.

2.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

2.4 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 Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design

professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

2.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type schedule within 20 days of date established for the Notice of Award.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
- C. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
- D. 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, and equipment required to achieve compliance, and indicate date by which recovery will be accomplished.

PART 3 - EXECUTION

3.1 SUBMITTAL REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Architect will review each action submittal, make marks to indicate corrections or modifications required, will stamp each submittal with an action stamp, and will mark stamp appropriately to indicate action.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

3.2 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Updating: At weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule before each regularly scheduled progress meeting.

1. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribute copies of approved schedule to Owner, Architect, subcontractors, testing and inspecting agencies, and parties identified by Contractor with a need-to-know schedule responsibility. When revisions are made, distribute updated schedules to the same parties.

END OF SECTION 013000

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Concealed Work photographs.
 - 3. Periodic construction photographs.
 - 4. Time-lapse sequence construction photographs.
 - 5. Final Completion construction photographs.
 - 6. Preconstruction video recordings.
 - 7. Periodic construction video recordings.
 - 8. Time-lapse sequence construction video recordings.
 - 9. Construction webcam.
- B. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
 - 2. Section 024119 "Selective Demolition" for photographic documentation before selective demolition operations commence.

1.2 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Contractor.
 - d. Date photograph was taken.
 - e. Description of location, vantage point, and direction.
 - f. Unique sequential identifier keyed to accompanying key plan.

1.3 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by

2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.

- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1.4 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs with maximum depth of field and in focus.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed.
 - 1. Flag excavation areas before taking construction photographs.
 - 2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
 - 3. Take 20 photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
 - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
 - 1. Underground utilities.
 - 2. Underslab services.
 - 3. Piping.
 - 4. Electrical conduit.
 - 5. Waterproofing and weather-resistant barriers.
- E. Periodic Construction Photographs: Take 20 photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.
- F. Final Completion Construction Photographs: Take 100 photographs after date of Substantial Completion for submission as Project Record Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
- B. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced.
 - 1. Show compliance with requirements for comparable product requests.
 - 2. Architect will review the proposed product and notify Contractor of its acceptance or rejection.
- C. Basis-of-Design Product Specification Submittal: Show compliance with requirements.
- D. Compatibility of Options: If the Contractor is given option of selecting between two or more products, select product compatible with products previously selected.
- E. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Deliver products to Project site in manufacturer's original sealed container or packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 3. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 - 4. Store materials in a manner that will not endanger Project structure.
 - 5. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
- F. 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.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. Provide products that comply with the Contract Documents, are undamaged, and, unless otherwise indicated, are new at the time of installation.

1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.
 2. Where products are accompanied by the term "as selected," Architect will make selection.
 3. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Where the following headings are used to list products or manufacturers, the Contractor's options for product selection are as follows:
1. Products:
 - a. Where requirements include "one of the following," provide one of the products listed that complies with requirements.
 - b. Where requirements do not include "one of the following," provide one of the products listed that complies with requirements or a comparable product.
 2. Manufacturers:
 - a. Where requirements include "one of the following," provide a product that complies with requirements by one of the listed manufacturers.
 - b. Where requirements do not include "one of the following," provide a product that complies with requirements by one of the listed manufacturers or another manufacturer.
 3. Basis-of-Design Product: Provide the product named, or indicated on the Drawings, or a comparable product by one of the listed manufacturers.
- C. Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
- D. Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Architect will consider Contractor's request for comparable product when the following conditions are satisfied:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications.
 3. List of similar installations for completed projects, if requested.
 4. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 EXECUTION REQUIREMENTS

A. Cutting and Patching:

1. Structural Elements: When cutting and patching structural elements, notify Structural Engineer of locations and details of cutting and await directions from Structural Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching.
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. 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.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.2 CLOSEOUT SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

C. Operation and Maintenance Data: Submit one copy of manual.

D. PDF Electronic File: Assemble manual into a composite electronically indexed file. Submit on digital media.

E. Record Drawings: Submit one set of marked-up record prints.

F. Record Digital Data Files: Submit data file and one set(s) of plots.

G. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

A. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.

B. Submittals Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:

1. 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 sections, including project record documents, operation and maintenance manuals, property surveys, similar final record information, warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 3. Submit maintenance material submittals specified in other sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect.
 4. Submit test/adjust/balance records.
 5. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Advise Owner of changeover in heat and other utilities.
 6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 7. Remove temporary facilities and controls.
 8. Complete final cleaning requirements, including touchup painting.
 9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1.4 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting inspection for determining final completion, complete the following:
1. Submit a final Application for Payment.
 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
- B. Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare final Certificate for Payment after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. 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.
- B. 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.

2.2 OPERATION AND MAINTENANCE DOCUMENTATION

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize manual into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system.
- C. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Include the following:
 1. Manufacturer's operation and maintenance documentation.
 2. Maintenance and service schedules.
 3. Maintenance service contracts. Include name and telephone number of service agent.
 4. Emergency instructions.
 5. Spare parts list and local sources of maintenance materials.
 6. Wiring diagrams.
 7. Copies of warranties. Include procedures to follow and required notifications for warranty claims

2.3 RECORD DRAWINGS

- A. Record Prints: Maintain a set of prints of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued. Mark to show actual installation where installation varies from that shown originally. Accurately record information in an acceptable drawing technique.
 1. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings.
 - 1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- 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.
- B. 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.
 - 1. Verify compatibility with and suitability of substrates.
 - 2. Examine roughing-in for mechanical and electrical systems.
 - 3. Examine walls, floors, and roofs for suitable conditions.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.
- E. Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- F. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

3.2 CONSTRUCTION LAYOUT AND FIELD ENGINEERING

- A. Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks.
- B. Engage a surveyor to lay out the Work using accepted surveying practices.

3.3 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. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 3. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations.
- C. 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.
- D. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.
- E. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. Where size and type of attachments are not indicated, verify size and type required for load conditions.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
- F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- G. Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

- A. Provide temporary support of work to be cut.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Cutting: Cut in-place construction using methods least likely to damage elements retained or adjoining construction.
1. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
- D. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction in a manner that will minimize evidence of patching and refinishing.
 2. 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.
 3. 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. Provide additional coats until patch blends with adjacent surfaces.

3.5 CLEANING

- A. Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
 - 3. Remove debris from concealed spaces before enclosing the space.
- B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:
 - 1. Clean Project site, yard, and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - 2. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.
 - 3. Remove labels that are not permanent.
 - 4. Clean transparent materials, including mirrors. Remove excess glazing compounds.
 - 5. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
 - 6. Vacuum carpeted surfaces and wax resilient flooring.
 - 7. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and foreign substances. Clean plumbing fixtures. Clean light fixtures, lamps, globes, and reflectors.
 - 8. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

3.6 OPERATION AND MAINTENANCE MANUAL PREPARATION

- A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are unavailable and where the information is necessary for proper operation and maintenance of equipment or systems.
- C. 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.

3.7 DEMONSTRATION AND TRAINING

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include a detailed review of the following:
 - 1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

END OF SECTION 017000

SECTION 017710 - PUNCHLIST

PART 1 – GENERAL (Not Used)

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

- A. Contractor to advise when space is available for punch list. Note that space must be ready to be reviewed by Project consultants, including Architect, Interior Designer, Structural Engineer, Lighting Consultant, MEPFP Engineer, and other consultants, and space must not be under construction.
- B. All consultants to issue punch lists within a week of walk through.
- C. Upon receipt of punch list, Contractor will complete all work identified within three weeks. Contractor to advise which punch list item completion cannot be achieved within the above time frame.
- D. Contractor will confirm in writing completion of all punch list items.
- E. All consultants and Owner to have final walk-through with Contractor to confirm punch list completion.
- F. Should there be any punch list items that require additional repairs, Contractor will complete within a week of final walk-through.
- G. Within 4 weeks, punch list must be 100% completed (excluding items identified in advance and agreed upon by Owner and consultants).
- H. Should punch list work not be 100% complete within 4 weeks, Owner reserves the right to use Contractor retainage monies still owed the Contractor to hire another contractor to complete the work. All consultant fees as well as Owner's personnel costs will be charged as part of the punch list remediation work.
- I. To summarize: Contractor has 4 weeks to complete the punch list once issued. At the 5th week, Owner, at its discretion, will hire another contractor to complete all the work at the original Contractor's expense including all soft costs associated with such remediation.

END OF SECTION 017710

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 017000 "Execution" for cutting and patching procedures.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

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

1.4 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control and for noise control. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's and other tenants' on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Submit before Work begins.
- F. 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.
- G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 QUALITY ASSURANCE

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

1.8 FIELD CONDITIONS

- A. Owner's tenant will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's tenant's operations will not be disrupted.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

1.9 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- C. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs or video.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

- f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
- g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

- E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Coordinate with new roofing requirements.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.

3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.

3.8 CLEANING

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

END OF SECTION 024119

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data.
- B. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

2.2 MATERIALS

- A. Steel Sheet: ASTM A 1003/A 1003M, Type H, Grade ST33H (ST230H), metallic coated, G60 (Z180), A60 (ZF180), AZ50 (AZ150), or GF30 (ZGF90) coating.
- B. Steel Studs: C-shaped, with flange width of not less than 1-5/8 inches (41 mm), minimum uncoated steel thickness of 0.0677 inch (1.72 mm) , and of depths indicated.
- C. Steel Joists: C-shaped, with flange width of not less than 1-5/8 inches (41 mm), minimum uncoated steel design thickness of 0.0677 inch (1.72 mm), and of depths indicated.
- D. Steel Track: U-shaped, minimum uncoated metal thickness same as studs or joists used with track, with flange widths of 1-1/4 inches (32 mm) for studs and 1-1/2 inches (38 mm) for joists, of web depths indicated.

2.3 ACCESSORIES

- A. Fabricate from the same material and finish used for framing members, of manufacturer's standard thickness and configuration, unless otherwise indicated.
- B. 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 according to ASTM E 488 conducted by a qualified testing agency.
- C. 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 according to ASTM E 1190 conducted by a qualified testing agency.

- D. Mechanical Fasteners: ASTM C 1513, self-drilling, self-tapping, steel drill screws, with corrosion-resistant coating.
- E. Galvanizing Repair Paint: ASTM A 780.
- F. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 FRAMING

- A. Install framing and accessories level, plumb, square, and true to line, and securely fastened, according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten framing members by welding or screw fastening.
- B. Install temporary bracing and supports to secure framing and support loads. Maintain braces and supports in place until supporting structure has been completed and permanent connections are secured.
- C. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members.
- D. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- E. Erection Tolerances: Install cold-formed metal framing with a maximum variation of 1/8 inch in 10 feet (1:960) and with individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- F. Studs: Install continuous top and bottom tracks securely anchored at corners and ends. Squarely seat studs against webs of top and bottom tracks. Space studs as indicated; set plumb, align, and fasten both flanges of studs to top and bottom tracks.
 - 1. Install and fasten horizontal bridging in stud system, spaced in rows not more than **48 inches (1219 mm)** apart.
 - 2. Install miscellaneous framing and connections to provide a complete and stable wall-framing system.
- G. Joists: Install and securely anchor perimeter joist track sized to match joists. Install joists bearing on supporting framing, brace and reinforce, and fasten to both flanges of joist track.
 - 1. Install bridging and fasten bridging at each joist intersection.

2. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners.

END OF SECTION 054000

SECTION 055113 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Shop Drawings and structural analysis data signed and sealed by a qualified professional engineer registered in the state where Project is located.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Stairs shall be capable of withstanding a uniform load of 100 lbf/sq. ft. (4.79 kN/sq. m) and a concentrated load of 300 lbf (1.33 kN) applied to an area of 4 sq. in. (2580 sq. mm). Uniform and concentrated loads need not be assumed to act concurrently.
- B. Railings shall be capable of withstanding a uniform load of 50 lbf/ft. (0.73 kN/m) and a concentrated load of 200 lbf (0.89 kN) applied to handrails and top rails of guards in any direction. Uniform and concentrated loads need not be assumed to act concurrently.
- C. Railing infill shall be capable of withstanding a concentrated load of 50 lbf (0.22 kN) applied horizontally to an area of 1 sq. ft. (0.093 sq. m). Infill load and other railing loads need not be assumed to act concurrently.
- D. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Component Importance Factor: 1.5.

2.2 METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500/A 500M (cold formed) or ASTM A 513.
- C. Iron Castings: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M.
- D. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, either commercial steel, Type B, or structural steel, Grade 30 (Grade 205).
- E. Expanded Metal, Carbon Steel: ASTM F 1267, Class 1 (uncoated).
- F. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

2.3 MISCELLANEOUS MATERIALS

- A. Extruded-Aluminum Nosings: Solid-abrasive-type extruded-aluminum units with abrasive filler consisting of aluminum-oxide or silicon-carbide grits, or a combination of both, in an epoxy-resin binder. Apply clear lacquer to concealed surfaces of units set into concrete.
- B. Concrete: Comply with Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).
- C. Welded Wire Fabric: ASTM A 185, 6 by 6 inches (152 by 152 mm) - W1.4 by W1.4.

2.4 FABRICATION

- A. General: Shear and punch metals cleanly and accurately. Remove burrs and ease exposed edges. Form bent-metal corners to smallest radius possible without impairing work.
- B. Welding: Use materials and methods that minimize distortion and develop strength of base metals. At exposed connections, finish welds and surfaces smooth.
- C. Stair Framing: Fabricate stringers of steel channels. Construct platforms of steel [channel] headers and miscellaneous framing members.
- D. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch (1.7 mm) thick.
- E. Abrasive-Coating-Finished, Formed-Metal Stairs: Form risers, treads, and platforms from steel sheet of thickness needed to comply with performance requirements, but not less than 0.097 inch (2.5 mm) thick. Finish tread and platform surfaces with manufacturer's standard, epoxy-bonded abrasive finish.
- F. Steel Tube Railings: Fabricate railings to comply with requirements indicated, but not less than that needed to withstand indicated loads.
 - 1. Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose.
 - 2. Form changes in direction of railings by bending or by inserting prefabricated fittings.
 - 3. Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
 - 4. Connect posts to stair framing by direct welding.

2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal stairs after assembly.
- B. Prepare uncoated ferrous metal surfaces to comply with SSPC-SP 3, and paint with a fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete." Install abrasive nosings with anchors fully embedded in concrete.
- D. Attach handrails to wall with wall brackets. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

END OF SECTION 055113

SECTION 055200 - METAL RAILINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Shop Drawings, Structural analysis data signed and sealed by a qualified professional engineer registered in New York State, and manufacturer's color charts showing the full range of colors available for factory-applied finishes.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Steel Pipe and Tube Railings

2.2 PERFORMANCE REQUIREMENTS

- A. Railings shall be capable of withstanding a uniform load of 50 lbf/ft. (0.73 kN/m) and a concentrated load of 200 lbf (0.89 kN) applied to handrails and top rails of guards in any direction. Uniform and concentrated loads need not be assumed to act concurrently.

2.3 METALS

- A. Steel Tubing: ASTM A 500/A 500M (cold formed) or ASTM A 513.
- B. Steel Pipe: ASTM A 53/A 53M, Schedule 40.
- C. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- D. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.4 OTHER MATERIALS

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107; recommended by manufacturer for exterior applications.
- B. Shop Primer for Iron and Steel Railings: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.
- C. Shop Primer for Galvanized Railings: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

2.5 FABRICATION

- A. Assemble railing systems in shop to the greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Form changes in direction of railing members by bending or mitering at elbow bends as indicated on drawings.
- C. Fabricate railing systems and handrails for connecting members by welding.
- D. Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.
- E. Provide wall returns at ends of wall-mounted handrails.

2.6 FINISHES

- A. Steel Railings: Hot-dip galvanized after fabrication, ASTM A 123/A 123M; cleaned and shop primed after galvanizing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fit exposed connections accurately together to form tight, hairline joints.
- B. Set railings accurately in location, alignment, and elevation and free of rack.
- C. Coat concealed aluminum surfaces that will be in contact with cementitious materials or dissimilar metals with a heavy coat of bituminous paint.
- D. Anchor posts in concrete by forming or core-drilling holes 5 inches (125 mm) deep and 3/4 inch (19 mm) greater than OD of post. Fill annular space between post and concrete with nonshrink, nonmetallic grout.
- E. Attach handrails to wall with wall brackets.

END OF SECTION 055200

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: ICC-ES evaluation reports for wood-preservative treated wood, fire-retardant treated wood.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.
- B. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Engineered wood products shall have allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be demonstrated by comprehensive testing.

2.2 TREATED MATERIALS

- A. Preservative-Treated Materials: 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, and Use Category UC4a for items in contact with the ground.
 - 1. Use treatment containing no arsenic or chromium.
 - 2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
 - 3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- B. Provide preservative-treated materials for all rough carpentry unless otherwise indicated.
 - 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, blocking, furring, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing members that are less than 18 inches (460 mm) above the ground.
 - 4. Wood floor plates that are installed over concrete slabs-on-grade.
- C. Fire-Retardant-Treated Materials: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Use Exterior type for exterior locations and where indicated.
2. Use Interior Type A unless otherwise indicated.
3. For enclosed roof framing, framing in attic spaces, and where high-temperature fire-retardant treatment is indicated, provide material with design adjustment factors of not less than 0.85 for modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
4. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
5. Identify with appropriate classification marking of a testing and inspecting agency acceptable to authorities having jurisdiction.

D. Provide fire-retardant treated materials for all rough carpentry.

2.3 MISCELLANEOUS LUMBER

- A. Miscellaneous Dimension Lumber: Construction, or No. 2 15 percent maximum moisture content of any species. Provide for nailers, blocking, and similar members.

2.4 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, Exterior, AC, fire-retardant treated, not less than 3/4-inch (19-mm) nominal thickness.

2.5 MISCELLANEOUS PRODUCTS

- A. Fasteners: Size and type indicated. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
1. Power-Driven Fasteners: CABO NER-272.
 2. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- B. Metal Framing Anchors: Structural capacity, type, and size indicated.
1. Use anchors made from hot-dip galvanized steel complying with ASTM A 653/A 653M, G60 (Z180) coating designation for interior locations where stainless steel is not indicated.
 2. Use anchors made from stainless steel complying with ASTM A 666, Type 304 for exterior locations and where indicated.
- C. Flexible Flashing: Self-adhesive product consisting of a butyl rubber or rubberized-asphalt compound, bonded to a backing sheet to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Do not splice structural members between supports unless otherwise indicated.
- D. Securely attach rough carpentry to substrates, complying with the following:
 - 1. CABO NER-272 for power-driven fasteners.
 - 2. Published requirements of metal framing anchor manufacturer.
 - 3. Table 2304.9.1, "Fastening Schedule," in the IBC.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.
4. Composite nail base insulated roof sheathing.
5. Sheathing joint-and-penetration treatment materials.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for plywood backing panels.
2. Section 072500 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.
4. Composite nail base insulated roof sheathing.
5. Subflooring and underlayment.
6. Sheathing joint-and-penetration treatment materials.

B. Product Data Submittals: 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 in accordance with ASTM D5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

- C. Shop Drawings: For air-barrier and water-resistant glass-mat gypsum sheathing assemblies.
 - 1. Show locations and extent of sheathing, accessories, and assemblies specific to Project conditions.
 - 2. Include details for sheathing joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 3. Include details of interfaces with other materials that form part of air barrier.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: From air-barrier and water-resistant glass-mat gypsum sheathing manufacturer, certifying compatibility of sheathing accessory materials with Project materials that connect to or that come in contact with the sheathing.
- C. Product Test Reports: For each air-barrier and water-resistant glass-mat gypsum sheathing assembly, indicating compliance with specified requirements, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated plywood.
 - 2. Fire-retardant-treated plywood.
 - 3. Foam-plastic sheathing.
 - 4. Air-barrier and water-resistant glass-mat gypsum sheathing.
- E. Field quality-control reports.

1.4 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.
- 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.

1.5 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 in accordance with 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, are to 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 are to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat all plywood unless otherwise indicated.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, 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 in accordance with 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 (3.2 m) 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 are to comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated

weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.

3. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested in accordance with ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry material after treatment to a 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 all plywood unless otherwise indicated.

2.4 WALL SHEATHING

- A. Paper-Surfaced Gypsum Sheathing: ASTM C1396/C1396M, gypsum sheathing; with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges.
 1. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
 2. Size: 24 by 96 inches (610 by 2438 mm) for horizontal 48 by 96 inches (1219 by 2438 mm) for vertical installation.
- B. Glass-Mat Gypsum Sheathing, Walls: ASTM C1177/C1177M.
 1. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
 2. Size: 48 by 96 inches (1219 by 2438 mm)] [48 by 108 inches (1219 by 2743 mm)] [48 by 120 inches (1219 by 3048 mm) for vertical installation.
- C. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing: ASTM C1177/C1177M, Type X, coated fiberglass mat gypsum sheathing with integral weather-resistant barrier and air barrier complying with ASTM E2178.
 1. Thickness: 5/8 inch (15.9 mm) thick.
 2. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.
 3. Edges: Square.
 4. Flashing and Transitions Strips: As acceptable to sheathing manufacturer.
 5. 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 when tested in accordance with ASTM E2178.
 6. Vapor Permeance: Minimum 20 perms (580 ng/Pa x s x sq. m) when tested in accordance with ASTM E96/E96M, Desiccant Method, Procedure A.
 7. Sheathing 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 in accordance with ASTM E2357.
 8. Fire Propagation Characteristics: Complies with NFPA 285 testing as part of an approved assembly.
 9. UV Resistance: Can be exposed to sunlight for [30] [90] [180] <Insert number> days in accordance with manufacturer's written instructions.
 10. 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 sheathing 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.

- D. Cellulose Fiber-Reinforced Gypsum Sheathing: ASTM C1278/C1278M, gypsum sheathing.
 - 1. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
 - 2. Size: 48 by 96 inches (1219 by 2438 mm).

2.5 PARAPET SHEATHING

- A. Plywood Sheathing, Parapets: Either DOC PS 1 or DOC PS 2, Exterior, Exposure 1, Structural I sheathing.
 - 1. Span Rating: Not less than 24/0.
 - 2. Nominal Thickness: Not less than 1/2 inch (13 mm).
- B. Oriented-Strand-Board Sheathing, Parapets: DOC PS 2, Exposure 1, Structural I sheathing.
 - 1. Span Rating: Not less than 24/0.
 - 2. Nominal Thickness: Not less than 5/8 inch (16 mm).
- C. Glass-Mat Gypsum Sheathing, Parapets: ASTM C1177/C1177M.
 - 1. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
 - 2. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.

2.6 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Subflooring: single-floor panels or sheathing.
 - 1. Span Rating: Not less than 24.
 - 2. Nominal Thickness: Not less than 7/8 inch (22.2 mm).
- B. Underlayment: Provide underlayment in nominal thicknesses indicated or, if not indicated, not less than 1/4 inch (6.4 mm) over smooth subfloors and not less than 3/8 inch (9.5 mm) over board or uneven subfloors.
 - 1. Plywood Underlayment for Resilient Flooring: DOC PS 1, with fully sanded face.
 - 2. Plywood Underlayment for Ceramic Tile: DOC PS 1, Exterior, C-C Plugged, not less than 5/8-inch (15.9-mm) nominal thickness.
 - 3. Plywood Underlayment for Carpet: DOC PS 1, Interior, Underlayment.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For parapet sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

2. For parapet sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except 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.
 1. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C954.
- G. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117. Provide washers or plates if recommended by sheathing manufacturer.

2.8 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.
- B. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

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, complying with the following:
 - 1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- D. Coordinate parapet 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.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. 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 INSTALLATION OF WOOD STRUCTURAL PANEL

- 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. Combination Subfloor-Underlayment:
 - a. Screw to cold-formed metal framing.
 - b. Space panels 1/8 inch (3 mm) apart at edges and ends.
 - 2. Subflooring:
 - a. Screw to cold-formed metal framing.
 - b. Space panels 1/8 inch (3 mm) apart at edges and ends.
 - 3. Underlayment:
 - a. Nail to subflooring.
 - b. Space panels 1/32 inch (0.8 mm) apart at edges and ends.
 - c. Fill and sand edge joints of underlayment receiving resilient flooring immediately before installing flooring.

3.3 INSTALLATION OF GYPSUM SHEATHING

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 2. Install panels with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
 - 3. Install panels with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.
 - 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of panels.
- D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
 - 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of panels.
- E. Seal sheathing joints in accordance with 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.
- F. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing:
 - 1. Install accessory materials in accordance with sheathing manufacturer's written instructions and details to form a seal with adjacent construction, to seal fasteners, and ensure continuity of air and water barrier.
 - a. Coordinate the installation of sheathing with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - b. 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.
 - 2. Connect and seal sheathing material continuously to air barriers specified under other Sections as well as 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.
 - 3. 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.
 - 4. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip, 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.
 - a. Transition Strip: Roll firmly to enhance adhesion.
 - 5. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of sheathing material with foam sealant.

6. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
7. Seal top of through-wall flashings to sheathing with an additional 6-inch- (150-mm-) wide, transition strip.
8. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
9. Repair punctures, voids, and deficient lapped seams in strips and transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.4 INSTALLATION OF CEMENTITIOUS BACKER UNITS

- A. Install panels and treat joints in accordance with ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.5 INSTALLATION OF HARDBOARD UNDERLAYMENT

- A. Comply with CPA's recommendations and hardboard manufacturer's written instructions for preparing and applying hardboard underlayment.
 1. Fastening Method: Nail underlayment to subflooring.

3.6 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.
- B. Testing and Inspecting Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Inspections: Air-barrier and water-resistant glass-mat gypsum sheathing, 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. 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.
 3. Termination mastic has been applied on cut edges.
 4. Strips and transition strips have been firmly adhered to substrate.
 5. Compatible materials have been used.
 6. Transitions at changes in direction and structural support at gaps have been provided.
 7. Connections between assemblies (sheathing and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 8. All penetrations have been sealed.
- D. Tests: As determined by testing agency from among the following tests:

- E. Air barriers will be considered defective if they do not pass tests and inspections.
- F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
- G. Prepare test and inspection reports.

END OF SECTION 061600

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Rubberized-asphalt sheet waterproofing.
- B. Related Sections include the following:
 - 1. Division 7 Section "Joint Sealants" for joint-sealant materials and installation.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide waterproofing that prevents the passage of water.

1.4 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
 - 1. Include Setting Drawings showing layout, sizes, sections, profiles, and joint details of concrete pavers with paver support assemblies.
- C. Samples: For the following products:
 - 1. 12-by-12-inch (300-by-300-mm) square of waterproofing and flashing sheet.
- D. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- E. Product Test Reports: From a qualified independent testing agency indicating and interpreting test results of waterproofing for compliance with requirements, based on comprehensive testing of current waterproofing formulations.

- F. Sample Warranty: Copy of special waterproofing manufacturer's and Installer's warranty stating obligations, remedies, limitations, and exclusions before starting waterproofing.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who is acceptable to waterproofing manufacturer to install manufacturer's products.
- B. Source Limitations: Obtain waterproofing materials through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Store rolls according to manufacturer's written instructions.
- E. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the following products:
 - 1. Rubberized-Asphalt Sheet Waterproofing:
 - a. W. R. Grace & Co.; Bituthene 3000 System.

2.2 RUBBERIZED-ASPHALT SHEET WATERPROOFING

- A. Rubberized-Asphalt Sheet: 60-mil- (1.5-mm-) thick, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated to a 4-mil- (0.10-mm-) thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
 - 1. Physical Properties: As follows, measured per standard test methods referenced:
 - a. Tensile Strength: 250 psi (1.7 MPa) minimum; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D 1970.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
 - e. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E 154.
 - f. Hydrostatic-Head Resistance: 150 feet (45 m) minimum; ASTM D 5385.
 - g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.
 - h. Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m); ASTM E 96, Water Method.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of sheet waterproofing material.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
- D. Sheet Strips: Self-adhering, rubberized-asphalt composite sheet strips of same material and thickness as sheet waterproofing.
- E. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
- F. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
- G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
- H. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, predrilled at 9-inch (225-mm) centers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 - 2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. 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.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
 - 1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch (1.6 mm)
- F. Bridge and cover isolation joints, expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips.
 - 1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
- G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
- H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 RUBBERIZED-ASPHALT SHEET APPLICATION

- A. Install self-adhering sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.

- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, rubberized-asphalt sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F (16 deg C).
- D. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.
- E. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
- F. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic or sealant.
- G. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
- H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheets extending 6 inches (150 mm) beyond repaired areas in all directions.
- I. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements, repair substrates, reapply waterproofing, and repair sheet flashings.

3.4 PROTECTION AND CLEANING

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071326

SECTION 07141 – COLD FLUID-APPLIED WATERPROOFING

1.1 GENERAL

A. SUMMARY

1. This Section includes but is not limited to the installation of a reinforced (2-layer) cold fluid-applied polymer modified asphaltic waterproofing system with all the materials, labor and supervision necessary to provide a continuous plaza waterproofing system.

B. SUBMITTALS

1. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and physical properties of waterproofing.
2. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
3. Product Test Reports shall yield the following results (for liquid adhesive applied at the rate of two gallons per 100 ft².):
 - a. ASTM D529-82, Weathering Daily Cycle B. No Cracking or crazing. No slump. May turn a slightly gray in color.
 - b. Hardness: Attains a Shore Hardness of 60 max.
 - c. Ductility: ASTM D113-79, at 1cm per minute (39.20F – 40C) 125% elongation minimum.
 - d. Water Permeability: ASTM E96 0.005 perms/hr./sq. ft.
 - e. Excellent adhesion to concrete, metals, glass, insulations, wood, coal-tar-pitch, and felts etc. Exceptions: silicones, Teflon, certain acrylics and animal fats.
 - f. Dry Film Thickness (minimum): 9 mils per gallon per 100 sq. ft.

C. QUALITY ASSURANCE

1. Installer Qualifications: A qualified installer, approved by manufacturer to install specified system. Installer is responsible for inspecting project for all relevant field conditions prior to installation. Conditions noted by installer are to be reported to Ownership, Designer of Record, Consultant and the General Contractor.
 - a. Installer to submit documentation from Manufacturer indicating the installer is an Approved Contractor in good standing and upon successful completion of the Work will qualify for the specified warranty.
 - b. Installer to submit documentation certifying they have installed a minimum of two (2) projects of similar size and scope within the past three (3) years.
2. Manufacturer Qualifications: Manufacturer shall have been in continuous business producing waterproofing materials as specified for a minimum of 20-years.
 - a. Manufacturer must not have filed for bankruptcy protection during any time of continued production.
3. Preinstallation Conference: Conduct conference at Project site. Preinstallation conference shall include but not be limited to the following attendees.
 - a. Building Owner or Owners authorized representative.

- b. Designer of Record
- c. Consultant
- d. Waterproofing Contractor
- e. Manufacturer's authorized technical representative.
- f. General Contractor, and any other trades having direct impact on the waterproofing system.

D. STORAGE

1. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.
2. Remove and replace liquid materials that cannot be applied within the published shelf life. Protect stored materials from direct sunlight.
3. Boxes containing the Waterproofing Sheet must be stored flat at all times, no more than 5 boxes high, on pallets or other means to elevate off the ground.
4. If indoor or trailer storage is not available, tarp with canvas, or breathable tarps only. DO NOT USE POLYETHYLENE OR OTHER NON-BREATHABLE FILMS TO COVER BOXES.
5. Remove rolls of Waterproofing Sheet from boxes when ready to use. Do not discard boxes as they will be required for storing any unused or partial rolls.
6. Store in a cool place out of direct sunlight. If trailer or indoor storage is used it should be well ventilated for summer storage and only a maximum of 600F for winter storage.

E. PROJECT CONDITIONS

1. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a potentially contaminated, soiled or unclean substrate without prior written approval from the manufacturer. Do not apply waterproofing to substrates with standing water, frost or ice. Surface dampness is acceptable provided no standing water is present.

F. WARRANTY

1. Special Warranty: Manufacturer's standard form, signed by manufacturer and owner/owners representative, agreeing to repair or replace waterproofing that does not comply with requirements or that does not remain watertight for a period of XX years after date of substantial completion.
2. Warranty shall be No-Dollar-Limit inclusive of material, labor and the removal and replacement/remediation of overburden required to access the condition.

2.1 PRODUCTS

A. MANUFACTURERS

1. Available Products: Subject to compliance with requirements, provide one of the following:
 - a. Laurenco Waterproofing System, as manufactured by FBC Chemical Corporation, Mars PA.

B. WATERPROOFING MATERIALS

1. Reinforced, Cold Fluid-Applied Waterproofing System.
 2. Primer N/A
 3. Adhesive: Specially formulated Asphalt modified with compatible proprietary rubber(s) using long fibers and clean aliphatic solvent.
- Page 4 of 7
- a. Solid Content 55% minimum.
 - b. Holding power 150lbs+ per sq.ft. at 900 pull on concrete substrate.
 - c. Meets or exceeds ASTM D2823, Type 1 and Federal Specifications SS-A-694D
 4. Reinforcing Sheet: 50 mil (1.3mm) (+/- 5%) proprietary chloroprene rubber modified asphalt.
 - a. Specially formulated Asphalt modified with Chloroprene Rubber (Neoprene) and Butyl rubber along with proprietary filler, curing agents and plasticizer.
 - b. Thickness of waterproofing sheet is 50 mil (+/- 5%).
 - c. Tensile Strength of waterproofing sheet = 75 lbf/in. min. (ASTM D146-90, Section 13) and (ASTM E 154-99, Section 9). Two (2) layer waterproofing "system" 180 lbf/in.
 - d. Puncture Resistance of waterproofing sheet = 215 lbs. (ASTM E154-99, Section 10). Two (2) layer waterproofing "system" >450 lbs.
 - e. Ductility of Modified Asphalt for use on waterproofing sheet: (ASTM D113-69) at 39.20F using 1cm per minute pull = 10% to 12.5% +. At 750F utilizing 5cm per minute pull = 100% to 125% +.
 - f. Softening point of modified asphalt used on waterproofing sheet: (ASTM D36-70 using distilled water) = 1600F minimum.
 - g. Penetration of Modified Asphalt used on waterproofing sheet: (ASTM D5-73) = 30 max. @ 770F using 3oz. seamless metal container.
 5. Performance Criteria for System (Sheet and Adhesive)
 - a. Water Permeability – inverted cup @ 750F, 25-day duration (ASTM E96-95 Procedure BW) 0.005 perms.
 - b. Weather test on Waterproofing "System" (ASTM D529-73 Daily Cycle B) 25-days. Hardness range of 60 +/- 5 pt. variation of a range of 0-99 Shore A hardness and no further changes after 10 cycles – Material stable with no cracking or crazing. Cycling continues for 25 days.
 - c. Pull Test Using 1" thick concrete slab and waterproofing "system", after cure, at the rate of 2"/minute = 26.39 psi. Slabs fractured due to 1" requirement of test apparatus.
 - d. Waterhead test results: Results incomplete as 210 foot limit of machine was reached at end of 28-days with no leakage.
 - e. Mullen Burst Test: (System) 160 psi minimum

C. FLASHING MEMBRANE ASSEMBLY

1. A flashing membrane assembly consisting of a liquid applied, flexible, polymethyl methacrylate (PMMA) base monolithic, self-terminating membrane formed by the combination of liquid PMMA based resin and fleece fabric reinforcement.
 - a. Laureco PMMA Flashing System by FBC Chemical Corporation, Mars PA.
2. Resin for Flashing Applications: A flexible, polymethyl methacrylate (PMMA) based resin combined with a thixotropic agent for use in combination with non-woven 110 g/m2, needle-punched polyester fabric reinforcement to form a monolithic

flashing membrane.

- a. Laurenco PMMA Flashing Resin

3. Fleece for Flashing Reinforcement: A non-woven, 110 g/m², needle-punched polyester fabric. Reinforcement as supplied by the membrane system manufacturer.

- a. Laurenco Reinforcing Fleece

D. PROTECTION COURSE:

A tough smooth surfaced, premium polymer modified asphaltic protection sheet. Manufactured with a fiberglass mat that is saturated and coated with high quality, asphaltic bitumen and polymer modifiers for a durable, flexible and easily applied sheet.

1. Protection sheet shall be a minimum 2.4 mm thick (94mils) and supplied in 39-3/8" by 49'-1" rolls.

- a. Laurenco SPC

E. MOLDED SHEET DRAINAGE PANELS

1. Composite drainage panels, 3 dimensional, non-biodegradable, manufactured with a permeable geotextile bonded to molded plastic-sheet drainage core and designed to effectively convey water.

- a. Laurenco Drain10 or Manufacture Approved Drainage Panel

G. ROOT BARRIER (if/where required)

1. High density polyethylene sheet manufactured for use as a mechanical barrier and root deflector to prevent vegetative roots from damaging waterproofing at planters. Root barrier is to be installed directly above the protection layer.

- a. Laurenco Root Barrier
- b. Laurenco Approved Root Barrier.

H. INSULATION (where required)

1. Horizontal – Extruded Polystyrene minimum 40 psi compressive strength with integrated drainage channels, complying with ASTM C578

2. Vertical – Expanded Polystyrene minimum 1" & 1lb density or Extruded Polystyrene minimum 20 psi compressive strength complying with ASTM C578.

3.1 EXECUTION

A. SURFACE PREPARATION

1. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust free, and surface dry (minimum) substrate for waterproofing application.

2. Remove grease, oil, form release agents, paints, curing compounds, and other penetrating contaminants or film forming coatings from concrete. For manufacturer approved recover application remove all loose or damaged material from substrate.

3. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets and other voids.

4. Prepare vertical and horizontal surfaces at terminations and penetrations through

waterproofing and at expansion joints, drains, and sleeves according to ASTM C898 and manufacturers written instructions.

a. Apply a double thickness of waterproofing and embed a joint reinforcing strip in preparation coat when recommended by waterproofing manufacturer.

5. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C898 and waterproofing manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.

6. Repair damaged or spalling substrates for roughness with epoxy repair mortar patches or one component cementitious parge coatings rated for vertical and overhead use that have high early strengths and are resistant to freeze-thaw. Provide a finish suitable for waterproofing installation, broom finish recommended.

B. INSTALL PMMA LIQUID FLASHING

1. Bond to wall and deck where indicated or required according to waterproofing manufacturer's instructions. (Deck to have strip of waterproofing membrane applied prior to the installation of PMMA. This allows encapsulation of the horizontal PMMA flashing liquid with the field waterproofing layers.)

C. WATERPROOFING APPLICATION:

1. Apply waterproofing in strict accordance with the manufacturer's written instructions or as directed by the manufacturer's on-site technical representative.

D. FLOOD TESTING:

1. All waterproofing work, is to be flood tested prior to the installation of protection sheet. (Flood testing can be completed after the installation of Laurencos SPC Protection Course however it will make repairs, if required, more time consuming and costly.)

2. Flood testing is to be conducted in compliance with ASTM D5957 with the following modification. Water depth is to be a minimum 2" maintained for a minimum 48 hours.

E. ELECTRONIC FIELD VECTOR TESTING (EFVM)

1. May be conducted in addition to, or in lieu of standard flood testing.

F. PROTECTION SHEET & DRAINAGE PANEL INSTALLATION

1. Follow waterproofing manufacturer's installation instructions for placement of protection sheet and drainage panels.

END OF SECTION 071410

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Surface-Burning Characteristics: According to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

PART 2 - PRODUCTS

2.1 INSULATION PRODUCTS

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, with flame-spread and smoke-developed indexes of 75 and 450, respectively.
- B. Glass-Fiber-Blanket Insulation: ASTM C 665, Type I, unfaced with flame-spread and smoke-developed indexes of 25 and 450, respectively.
- C. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, and minimum density of 1.5 lb/cu. ft. (24 kg/cu. m).
- D. Open-Cell Polyurethane Foam Insulation: Spray-applied polyurethane foam using water as a blowing agent, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, and minimum density of 0.4 lb/cu. ft. (6.4 kg/cu. m).

2.2 ACCESSORIES

- A. Vapor Retarder: Polyethylene 6 mils (0.15 mm) thick.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install insulation in areas and in thicknesses indicated or required to produce R-values indicated. Cut and fit tightly around obstructions and fill voids with insulation.
- B. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

- C. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
- D. Except for loose-fill insulation and insulation that is friction fitted in stud cavities, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- E. Spray-Applied Insulation: Apply insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs.
- F. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage. Locate seams at framing members, overlap, and seal with tape. Seal joints caused by pipes, conduits, electrical boxes, and similar items with tape.

END OF SECTION 072100

SECTION 07 42 43 - Composite Wall Panels

NorthClad® ACM Panel System
Published: 07/2018

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Composite wall panel dry joint, pressure-equalized rainscreen system.
2. Accessories including sub girts, aluminum panel splines, aluminum panel bases, head flashings, clips, shims, fasteners, and aluminum trim prefinished to match aluminum wall panels.

B. Related Sections:

1. Section 05 40 00 - Cold-Formed Metal Framing
2. Section 06 10 00 - Rough Carpentry
3. Section 06 16 43 - Gypsum Sheathing
4. Section 07 25 00 - Air Barriers
5. Section 07 62 00 - Sheet Metal Flashing and Trim
6. Section 07 92 00 - Joint Sealants

1.2 REFERENCES

A. Reference Standards: Current edition at date of Bid.

B. American Architectural Manufacturers Association (AAMA):

1. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.
2. AAMA 508-07 - Voluntary Test Method and Specifications for Pressure Equalized Rain Screen Wall Cladding Systems.

C. ASTM International:

1. ASTM B 117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
2. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
3. ASTM D 294 - Method of Tumbler Test for Coke.
4. ASTM D 659 - Method of Evaluating Degree of Chalking of Exterior Paints.
5. ASTM D 882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
6. ASTM D 968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
7. ASTM D 2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
8. ASTM D 2247 - Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
9. ASTM D 3352 - Standard Test Method for Strontium Ion in Brackish Water, Seawater, and Brines.

10. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
11. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
12. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
13. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Conform to provisions of Section 01 31 13 for coordination with work of other Sections.

1. Section 07 25 00 for application of weather resistive barrier over exterior sheathing substrate specified.
2. Section 06 16 43 following installation of sub girt system as required to seal and make a continuous air barrier.

B. Preconstruction Meetings: Conform to provisions of Section 01 31 19.

1. Attendance: Contractor, Applicator, Owner, Architect, and those specifically requested to attend.
 - a. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Review methods and procedures related to aluminum composite panel installation, including manufacturer's written instructions.
 - c. Examine support conditions for compliance with requirements, including alignment between and attachment to the structural members.
 - d. Review flashings, special details, wall penetrations, openings, and condition of other construction that will affect aluminum wall panels.
 - e. Review temporary protection requirements for aluminum composite wall panel assembly during and after installation.
 - f. Review wall panel observation and repair procedures after aluminum wall panel installation.
2. Meeting Time: Minimum 3 weeks prior to commencement of work covered by this Section and any related work affecting work covered by this Section.
3. Meeting Location: Project Site.

1.4 DESIGN REQUIREMENTS

- A. Components: Designed and manufactured to withstand dead and live loads caused by positive and negative wind pressure acting normally to plane of composite wall panels.
- B. Wall Panel Deflection: $L/180$.
- C. Perimeter Framing Deflection: $L/180$.
- D. Thermal Movement: Design system to accommodate vertical and horizontal thermal movement of

components without causing distortion, excessive stress on fasteners, or oil canning when subjected to recurring temperature variations.

E. Drainage: Design for positive drainage of water leakage and condensation to exterior of wall panel system.

F. Tolerance of Substructure: Design system to accommodate up to 1/4 inch in 10 feet variation out of plane.

G. Seismic Design: Conform to International Building Code for the Seismic Category appropriate for location of system installation.

1.5 PERFORMANCE REQUIREMENTS

A. Provide the following testing documentation: Testing documentation must be current and meet or exceed specified design and performance requirements, and must be documented and certified by an independent testing agency acceptable to Architect and applicable building code jurisdiction.

B. Preload at +12.5 pounds per square foot.

C. Air Infiltration in accordance with ASTM E 283 (at 1.57 pounds per square foot): 0.117 cubic feet per minute per square foot.

D. Water Penetration in accordance with ASTM E 331 (at 6.24 pounds per square foot): Approximately 0.3 square feet.

E. Water Penetration in accordance with AAMA 501.1 (at 6.24 pounds per square foot): Approximately 0.8 square feet.

F. Static Pressure Air Infiltration (at 6.24 pounds per square foot): Less than 0.01 cubic feet per minute per square foot.

G. Static Pressure Water Resistance (at 15 pounds per square foot): No uncontrolled leakage.

H. Uniform Load Deflection:

1. At +25.0 pounds per square foot design load: No damage.
2. At -25.0 pounds per square foot design load: No damage.
3. Repeat Static Pressure Air Infiltration:
4. At 6.24 pounds per square foot: Less than 0.01 cubic feet per minute per square foot.
5. At 15.00 pounds per square foot: No uncontrolled leakage.
6. Dynamic Pressure Water Resistance (at 15 pounds per square foot): No uncontrolled leakage.

I. Pressure Equalized Rainscreen:

1. Interstory Horizontal Displacement (drift):

- a. At 3/4-inch left/right: No visible damage.

2. Interstory Horizontal Displacement (maximum):

- a. At 3.0 inches left/right: No visible damage.

3. Repeat Static Pressure Air Infiltration:

- a. At 6.24 pounds per square foot: Less than 0.01 cubic feet per minute per square foot.
- b. At 15.00 pounds per square foot: No uncontrolled leakage.

4. Uniform Structural Overloads:

- a. At +37.5 pounds per square foot (Overloads): No damage.
- b. At -37.5 pounds per square foot (Overloads): No visible damage.

1.6 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. LEED Credits: Conform to Section 01 81 13 for documentation of LEED Credits contributing to Certification of Project under USGBC LEED 2009 (Version 3.0) Green Building Rating System for Sustainable Building Requirements.
- C. Buy American Act Certification: Submit documentation certifying that products comply with provisions of the Buy American Act 41 U.S.C. 10a-10d.
- D. Product Test Reports: Indicate compliance of products with requirements from qualified, independent testing agency.
- E. Shop Drawings:

1. Provide detail drawings prepared by manufacturer or manufacturer's authorized agent showing openings and penetrations.
2. Include details of each condition of installation and attachment.
3. Provide details at a minimum scale of 1-1/2 inch per foot of all required trim needed for complete installation.
4. Provide shop drawings reflecting deviations from manufacturer's standard details and details differing from Contract Documents.
5. Include components, metal panel profile(s), dimensions, joinery dimensions, configurations, and reason for deviation.

F. Product Data:

1. Manufacturer's technical data, installation instructions, standard detail drawings specific and manufacture qualification letter including past projects

G. Product Samples: 2-inch x 3 inch showing specified finish for each specified wall.

H. Manufacturer's Instructions: Indicate installation requirements, rough-in dimensions, special procedures, and conditions requiring special attention.

I. Sample Warranty: Meet or exceed provisions specified by this Section.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Minimum of 10 years' experience in fabricating and supplying metal wall panel systems.
2. Responsible for technical design support as required for system conforming to panel manufacturer's warranty provisions.
3. Provide review and approval of shop drawings differing from panel manufacturer's standard details prior to installation and conduct interim inspections during construction.

B. Installer Qualifications:

1. Able to document a minimum 7 years' experience installing commercial metal wall panel systems.

2. Employ job-site foreman, with minimum of 3 years' experience supervising installation of metal wall panel work of this Section, dedicated to Work of this Contract.
3. Foreman: Continuously on site for duration of work of this Section for this Project.

C. Single Source Responsibility:

1. Perform metal panel and related flashing and sheet metal work by or under supervision of single installer.

1.8 WARRANTY

- A. Provide Warranties under provisions of Section 01 78 36.
- B. Manufacturer Coating Performance Warranty: 20-year warranty against fading, color change, chalking, peeling, cracking, or delaminating of the coating system. Can vary by finish selection.
- C. Contractor: 5-year labor warranty for panel installation, including, flashings, sealants, fasteners, and accessories to remain functioning.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, aluminum wall panels, and other manufactured items to prevent damage or deformity.
- B. Package aluminum wall panels for protection during transportation and handling.
- C. Unload, store, and erect aluminum wall panels in a manner to prevent bending, warping, twisting, and surface damage.
- D. Store aluminum wall panels vertically, covered with suitable weather tight and ventilated covering.
- E. Store aluminum wall panels to ensure dryness, with positive slope for drainage of water.
- F. Do not store aluminum wall panels in contact with other materials that may cause staining, denting, or other surface damage.
- G. Do not allow storage space to exceed 120 degrees Fahrenheit.

PART 2 PRODUCTS

2.1 SYSTEMS

- A. Composite Wall Panels: Install concealed clips and/or fasteners over substrate system.

2.2 MANUFACTURERS

- A. Subject to compliance with requirements, provide products manufactured by NorthClad® Rainscreen Solutions, 11831 Beverly Park Road, Building C, Everett, Washington 98204, telephone 425-740-3702, e-mail: dkillian@northclad.com, website: www.northclad.com.

1. NorthClad® ACM:
2. Panel Skin Material: Select one, subject to compliance with requirements: Alpollic, Alcotex, Reynobond, Larson or approved equal.
3. Panel Material Thickness: 4 millimeters.
4. Panels rated as either Class A (FR) or B (PE) as required by code or project specific specification when tested in accordance with ASTM E84 (Steiner Tunnel Test).
5. Submit alternate tested systems by other manufacturers/fabricators to architect not less than 30 days prior to bid.

2.3 COMPOSITE PANEL MATERIALS

A. Composition:

1. Aluminum composite material comprised of a thermoplastic core sandwiched between two aluminum sheets formed in a continuous process with no applied glues or adhesives.

B. Tolerances:

1. Panel bow not to exceed $L/175$ of panel overall dimension in width or length.
2. Panel dimensions allow for field adjustment and thermal movement.
3. Panel lines will be sharp, smooth, and free from warps or buckles.

C. Condition: Panel surfaces will be free of scratches and marks caused during fabrication.

D. Uniformity:

1. If metallic color is used, panel grain must be maintained.

E. Vapor Management: Fabricate panels for control of condensation and ventilation of the rainscreen cavity.

F. Expansion/Contraction: Engineer panels to permit required expansion and contraction using concealed anchors.

G. Strippable Protective Film: Factory applied for protection of weather face finish and removed upon completion of the panel installation. Failure to remove the film may lead to over-exposure and damage to the panel.

2.4 FASTENERS

A. Supply Fasteners and clips tested to meet provisions of this section, as approved by fastener manufacturer and engineer of record.

B. Exposed Fasteners:

1. Stainless steel blind unless recommended by the panel manufacturer.
2. Construction Fasteners, Inc., ZAC, self-drilling, self-tapping, non-corrosive fasteners with heads finished to match panel finishes and flashings, gasketed with EPDM washers, and as instructed by manufacturer.

C. Concealed Sheet Metal Fasteners: Panhead, self-drilling, self-tapping, non-corrosive fasteners, and as instructed by manufacturer and engineer of record.

D. Fastener Lengths: Penetrate into cold formed metal framing and subgirts, and other metal framing systems per fastener manufacturer's recommendations.

2.5 SYSTEM COMPONENTS

A. Subgirts:

1. Provide G90 galvanized steel of gauge and spacing required for metal wall panel system structural requirements and as recommended by the panel manufacturer and engineer of record in accordance with approved shop drawings.
2. To avoid galvanic reaction, separate dissimilar materials.

2.6 FLASHINGS

A. Metal Flashing, Fascias, and Trim:

1. 0.032-inch minimum thickness.
2. Material, color, and finish to match wall panels.
3. Conform to provisions of Section 07 60 00.

B. Panel and Flashing Closures: Waterproof, semi-rigid, polyethylene closed cell foam, or solid rubber in size and shape to snugly fit panel configuration.

C. Cutting and Fitting:

1. Make all cuts neat, square, and true.
2. Saw-cut or rout panels, de-burr edges, and clean filings from adjacent surfaces.

2.7 SEALANTS

A. Conform to Section 07 92 00 and manufacturers' instructions.

2.8 FINISH

A. Panel Finishes:

1. Utilize coating with a fluoropolymer coating with 70% Kynar® 500 resins.
2. Select colors from manufacturer's standard colors.
3. Pencil Hardness - ASTM D3352-74: Use an Eagle Turquoise HB-H pencil as a minimum.

B. Impact Adhesion - ASTM D294-84: No cracking or loss of adhesion in coating.

C. Cure Test - NCCA 11-18: Withstand 50+ double rubs of MEK.

D. Humidity Resistance ASTM D2247-85: No blisters after 3,000 hours of 100% humidity at 95 degrees Fahrenheit.

E. Salt Spray Resistance - ASTM B117-85: After 3,000 hours of exposure to 5 percent salt fog at 95 degrees Fahrenheit, show few #8 blisters and less than 1/8" average creepage from scribe.

F. Weatherometer Test - ASTM D882-86/G23-88: No cracking, peeling, blistering, or loss of adhesion after 2,000 hours in coating.

G. Chalking Resistance - ASTM D659-86: No chalking greater than #8 after 10 years of Florida exposure at 45 degrees S.

H. Color Change - ASTM D2244-74: Color change not to exceed 5 NBS units after 10 years of Florida exposure at 45 degrees S for 5,000 hours.

I. Abrasion Resistance - ASTM D968-81: Resist 65+/-15 liters/mil minimum of falling sand on coating.

J. Color: Select from the full range of manufacturers' standard colors.

K. Anodized Finish (if specified):

1. Class 1, Clear Anodic Finish: AA-M12C22A41 (mechanical finish: nonspecular as fabricated; chemical finish: etched, medium matte; anodic coating: Architectural Class 1, clear coating 0.018 mm or thicker) complying with AAMA 607.1.
2. Class 1, Clear Anodic Finish: AA-M12C22A44 (mechanical finish: nonspecular as fabricated; chemical finish: etched, medium matte; anodic coating: Architectural Class 1 integrally colored or electrolytically deposited color coating 0.018 mm or thicker complying with AAMA 606.1 or AAMA 608.1.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify installation conditions satisfactory to receive work of this Section before beginning.
- B. Verify substrate installation complete, flat, and true to plane.

3.2 PREPARATION

- A. Field Measurements: Verify prior to fabrication of metal panels and flashings.
- B. Electrolytic Protection: Treat contacting surfaces of dissimilar metal of different galvanic range with non-absorptive tape, gaskets, or as instructed by manufacturer.
- C. Protect surrounding areas and surfaces to preclude damage during work of this Section.
- D. Lay out work before beginning installation as necessary for true, plumb, and aligned panel installations. Verify locations of joints and panel lengths.

3.3 INSTALLATION

- A. Conform to manufacturer's instructions and provisions of Contract Documents.
- B. Install to allow thermal movement of metal panels.

3.4 SUBGIRTS AND FASTENERS

- A. Space, locate, align, and fasten subgirt hat channel framing over gypsum sheathing after application of air barrier specified by Section 07 25 00.
- B. Install fasteners in lengths and locations required in order to penetrate hat channels and structural metal wall framing in accordance with fastener manufacturers' instructions.
- C. Torque screws as necessary for a snug fit. Do not over-torque; prevent 'oil canning' of panels.

3.5 METAL WALL PANELS

- A. Lock panels in place to engage interlocking seams.
- B. Do not stretch or compress interlocks.
- C. Secure panels in place with panels aligned and without warp or deflection.
- D. Make cutting and fitting neat, square, and true. Where required saw cut, de-burr edges, and clean filings from adjacent surfaces. No torch cutting permitted.

3.6 PANEL GIRTS AND FASTENERS

- A. Space, locate, and align for even distribution of exposed fasteners, as instructed by manufacturer and engineer of record.
- B. Install fasteners in lengths and locations required to penetrate per fastener manufacturers' instructions.
- C. Torque screws as necessary for snug fit. Do not over-torque; prevent damage to panels.

3.7 FLASHINGS

- A. Install flashings as part of manufactured system as necessary to seal and close ends and to restrict water penetration behind wall panels.
- B. Thermal Movement: Install flashing systems to allow unrestricted thermal movement of metal panels over attachment clips.

- C. Penetrations: Make cutouts and edge clearances of sufficient size and shape to allow unrestrained thermal movement and to prevent contact of metal panels with penetrations.
- D. Metal Flashing: Make overlaps minimum 4 inches and in conformance to Section 07 60 00.
- E. Cutting and Fitting: Make neat, square, and true. Saw-cut panels or rout, de-burr edges, and clean filings from adjacent surfaces.

3.8 ADJUSTING

- A. Correct identified defects and irregularities.

3.9 CLEANING

- A. Leave installation clean and free from residue and debris from work of this Section.

3.10 PROTECTION

- A. Take measures to protect metal panel installations from construction activities for duration of project. Do not permit activities that may result in gouging, scratching, or denting metal panels and flashing.

END OF SECTION



EVERGUARD TPO

Mechanically Attached System Specification Section - 07540

GAF Spec Number Legend

T = TPO

MA= Mechanically Attached System
FA= Adhered System
BA= Ballast System

N=New
T=Tear-off
R=Recover

I=Insulated
N=Non-insulated

45= 45 mil
60= 60 mil
80= 80 mil
45FB= 45 mil (Fleece-Back)
60FB= 60 mil (Fleece-Back)
80FB= 80 mil (Fleece-Back)

GAF® EVERGUARD® TPO SPECIFICATION**PART 1 GENERAL****1.01 SUMMARY**

- A. Section Includes
 - 1. Thermoplastic Polyolefin Single-Ply Roofing Membrane
 - 2. Thermoplastic Polyolefin Flashings
 - 3. Thermoplastic Polyolefin Accessories
 - 4. Roof Insulation
- B. Related Sections
 - 1. Section 06100: Rough Carpentry
 - 2. Section 07620: Sheet Metal Flashing and Trim
 - 3. Section 15430: Plumbing Specialties

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM) - *Annual Book of ASTM Standards*
 - 1. ASTM D-751 – Standard Test Methods for Coated Fabrics
 - 2. ASTM D-2137 - Standard Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics
 - 3. ASTM E-96 - Standard Test Methods for Water Vapor Transmission of Materials
 - 4. ASTM D1204 - Standard Test Method for Linear Dimensional Changes of Non Rigid Thermoplastic Sheeting or Film at Elevated Temperature
 - 5. ASTM D-471 - Standard Test Method for Rubber Property—Effect of Liquids
 - 6. ASTM D-1149 - Standard Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment
 - 7. ASTM C-1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
 - 8. ASTM C-1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
 - 9. ASTM E 903 – Standard Test Method for Solar Absorptance, Reflectance, and Transmission of Materials Using Integrating Spheres
- B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - *Architectural Sheet Metal Manual*
- C. National Roofing Contractors Association (NRCA)
- D. American Society of Civil Engineers (ASCE)
- E. U.S. Green Building Council (USGBC)
 - 1. Leadership in Energy and Environmental Design (LEED)
- F. Factory Mutual (FM Global) - *Approval Guide*
- G. Underwriters Laboratories (UL) - *Roofing Systems and Materials Guide* (TGFU R1306)
- H. California Title 24 Energy Efficient Standards
- I. ENERGY STAR

GAF® EVERGUARD® TPO SPECIFICATION

J. Cool Roof Rating Council (CRRC)

K. Miami Dade County

1.03 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D1079 and the glossary of the National Roofing Contractors Association (NRCA) *Roofing and Waterproofing Manual* for definitions of roofing terms related to this section.

1.04 SUBMITTALS

A. Product Data: Provide product data sheets for each type of product indicated in this section.

B. Shop Drawings: Provide manufacturers standard details and approved shop drawings for the roof system specified.

C. Samples: Provide samples of insulations, fasteners, membrane materials and accessories for verification of quality.

D. Certificates: Installer shall provide written documentation from the manufacturer of their authorization to install the roof system, and eligibility to obtain the warranty specified in this section.

E. L.E.E.D. submittal: Coordinate with Section 01115 - Green Building Requirements, for LEED certification submittal forms and certification templates.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications: GAF® shall provide a roofing system that meets or exceeds all criteria listed in this section.

B. Installer's Qualifications:

1. Installer shall be classified as a **Master or Master Select™** contractor as defined and certified by GAF®.
2. Installer shall be classified as a **Master Select™** contractor as defined and certified by GAF®.
3. Installer shall be classified as a **Master** contractor as defined and certified by GAF®.
4. Installer shall be classified as a **Certified Maintenance Professional** as defined and certified by GAF®.

C. Source Limitations: All components listed in this section shall be provided by a single manufacturer or approved by the primary roofing manufacturer.

D. Final Inspection Manufacturer's representative shall provide a comprehensive final inspection after completion of the roof system. All application errors must be addressed and final punch list completed.

1.06 QUALITY ASSURANCE

A. Cold storage, more than most construction, requires correct design, quality materials, good workmanship, and close supervision. Design should ensure that proper installation can be accomplished under various adverse job site conditions. Materials must be compatible with each other. Installation must be made by careful workers directed by an experienced, well-trained superintendent. Close cooperation between the general, roofing, insulation, and other contractors increases the likelihood of a successful installation.

GAF® EVERGUARD® TPO SPECIFICATION

- B. The cold storage/freezer envelope system must be installed by a Master or Master Select™ in compliance with shop drawings as approved by GAF. There must be no deviations made without PRIOR WRITTEN APPROVAL of GAF.
- C. For a start-up and/or an interim inspection contact a Field Service Representative of GAF.
- D. Upon completion of the installation, an inspection will be conducted by a Field Service Representative of GAF to ascertain the roofing system has been installed according to GAF's specifications and details.
- E. In the United States, the U.S. Public Health Service Food and Drug Administration developed the Food Code (FDA 1997), which consists of model requirements for safeguarding public health and ensuring that food is unadulterated. The code is a guide for establishing standards for all phases of handling refrigerated foods. These standards must be recognized in the design and operation of refrigerated storage facilities.
- F. Regulations of the Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), the U.S. Department of Agriculture (USDA), and other standards must also be followed.
- G. Incorrect design and poor installation can cause moist air leakage into the facility, resulting in frost and ice formation, energy loss and, eventually, expensive repairs.
- H. A continuous and uninterrupted vapor/air seal must encapsulate the building structure to prevent warm, humid air from infiltrating the roof assembly around the perimeter and penetrations. In freezer applications the vapor barrier under the floor slab must provide a sealed transition to prevent air leakage at the insulated wall panel/floor junction.
- I. Cold storage facilities can change in dimension due to settling, temperature change, and other factors; therefore, cold storage facilities should be inspected regularly to spot problems early, so that preventive maintenance can be performed in time to avert serious damage.

1.07 PRE-INSTALLATION CONFERENCE

- A. Prior to scheduled commencement of the roofing installation and associated work, conduct a meeting at the project site with the installer, architect, owner, GAF® representative and any other persons directly involved with the performance of the work. The installer shall record conference discussions to include decisions and agreements reached (or disagreements), and furnish copies of recorded discussions to each attending party. The main purpose of this meeting is to review foreseeable methods and procedures related to roofing work.

1.08 PERFORMANCE REQUIREMENTS

- A. Provide an installed roofing membrane and base flashing system that does not permit the passage of water, and will withstand the design pressures calculated in accordance with the most current revision of ASCE 7.
- B. Provide an installed roofing membrane and base flashing system that does not permit the passage of water, and will withstand the design pressures determined in FM Global Loss Prevention Data Sheet 1-28, to meet a 1-60 or greater wind uplift rating as required by location.
- C. GAF® shall provide all primary roofing materials that are physically and chemically compatible when installed in accordance with manufacturers current application requirements.

GAF® EVERGUARD® TPO SPECIFICATION**1.09 REGULATORY REQUIREMENTS**

- A. All work shall be performed in a safe, professional manner, conforming to all federal, state and local codes.
- B. Exterior Fire Test Exposure: Provide a roofing system achieving a UL Class **A** rating for roof slopes indicated.
- C. Windstorm Classification: Provide a roofing system which will achieve a Factory Mutual **1-90** wind uplift rating, as listed in the current FM Approval Guide.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver all roofing materials to the site in original containers, with factory seals intact. All products are to carry a GAF® label.
- B. Store all pail goods in their original undamaged containers in a clean, dry location within their specified temperature range. Reference data sheets for product storage requirements.
- C. Do not expose materials to moisture in any form before, during or after delivery to the site. Reject delivery of materials that show evidence of contact with moisture.
- D. Use “breathable” type covers such as canvas tarpaulins to allow venting and protection from weather and moisture. Cover and protect materials at the end of each work day. Do not remove any protective tarpaulins until immediately before the material will be installed.

1.11 PROJECT CONDITIONS

- A. Weather
 - 1. Proceed with roofing only when existing and forecasted weather conditions permit.
 - 2. Ambient temperatures must be above 45°F (7.2°C) when applying hot asphalt or water based adhesives.

1.12 JOB CONDITIONS

- A. All steel beams, columns, and large pipes that project through the insulation should be vapor-sealed and insulated with a 4-foot high wrap of insulation. The height of insulation at conduits, small pipes, and rods should be four times the regular wall insulation thickness. In both cases, the thickness of insulation on the projection should be half that on the regular wall or ceiling.
- B. Temperature Pulldown
 - 1. Because of the low temperatures in freezer facilities, contraction of structural members in these spaces will be substantially greater than in any surrounding ambient or cooler facilities. Therefore, contraction joints must be properly designed to prevent structural damage during facility pulldown.
 - 2. The first stage of temperature reduction should be from ambient down to 35° F at whatever rate of reduction the refrigeration system can achieve.
 - 3. The room should then be held at that temperature until it is dry. Finishes are especially subject to damage when temperatures are lowered too rapidly. Portland cement plaster should be fully cured before the room is refrigerated.

GAF® EVERGUARD® TPO SPECIFICATION

4. If there is a possibility that the room is airtight (most likely for small rooms, 20 feet by 20 feet maximum), swinging doors should be partially open during pulldown to relieve the internal vacuum caused by the cooling of the air, or vents should be provided. Permanent air relief vents are needed for continual operation of defrosts in small rooms with only swinging doors. Both conditions of possible air heating during defrost and cooling should be considered in design of air vents and reliefs.
5. The concrete slab will contract during pulldown, causing slab/wall joints, contraction joints, and other construction joints to open. At the end of the holding period (i.e., at 35° F), any necessary caulking should be done.
6. An average time for achieving dryness is 72 hours. However, there are indicators that may be used, such as watching the rate of frost formation on the coils or measuring the rate of moisture removal by capturing the condensation during defrost.
7. After the refrigerated room is dry, the temperature can then be reduced again at whatever rate the refrigeration equipment can achieve until the operating temperature is reached. Rates of 10° F per day have been used in the past, but if care has been taken to remove all the construction moisture in the previous steps, faster rates are possible without damage.

1.13 WARRANTY/GUARANTEES

Provide manufacturers standard **WeatherStopper®**

Diamond Pledge™ Guarantee

1. **Single source coverage** and no monetary limitation where the manufacturer agrees to repair or replace components in the roofing system, which cause a leak due to a failure in materials or workmanship.
 - a) Duration: Twenty (20)
 - b) **WELL ROOF™ Extension.** GAF® also guarantees to the original or first subsequent owner coverage extension by 25% of the original guarantee length, provided that the roof is inspected and maintained in accordance with the MAINTAINENCE section of this specification.

B. Provide manufacturers standard **WeatherStopper® System Pledge™ Guarantee**

1. Single source coverage and a monetary limitation of one (1) dollar per square foot where the manufacturer agrees to repair or replace components in the roof system, which cause a leak due to failure in materials or workmanship.
 - a) Duration: Twenty (20) years from the date of completion.

*Materials and workmanship of listed products within this section when installed in accordance with current GAF® application and specification requirements. Contact GAF® Contractor Services for the full terms and conditions of the guarantee.

C. Provide manufacturers standard **WeatherStopper® Integrated Roofing System Guarantee**

1. The manufacturer agrees to repair or replace the portion of the roofing materials, which have resulted in a leak due to a manufacturing defect or defects caused by ordinary wear and tear.
 - a) Duration: Twenty (20) years from the date of completion.

D. Provide manufacturers **Vapor Seal Addendum** to the **Diamond Pledge NDL Roof Guarantee**

1. The manufacturer agrees to repair or replace roof to wall junctures of the roofing system that has been compromised due to a manufacturing defect or misapplication of the GAF Vapor Barrier Product.
 - a) Duration: Five (5) years from the date of warranty issuance

GAF® EVERGUARD® TPO SPECIFICATION

**This Guarantee does NOT cover conditions other than leaks, except to the extent of condensation or moisture intrusion issues due to a manufacturing defect or misapplication of the GAF Vapor Barrier Products installed on the roof. Contact GAF® Technical Support Services for the full terms and conditions.*

- E. Provide manufacturers standard prorated material warranty
 - 1. The manufacturer agrees to repair or replace the portion of the roofing materials that have resulted in a leak due to a manufacturing defect or defects caused by ordinary wear and tear.
 - a) Duration: 20 years.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

- A. GAF® - 1 Campus Drive, Parsippany, NJ 07054

2.02 AIR AND VAPOR RETARDER SYSTEM

- A. Proprietary formulated elastomeric styrene-butadiene-styrene (SBS) polymer modified bitumen in combination with a high tack self-adhesive, **GAF SA Vapor Retarder** by GAF.

2.03 INSULATION

- A. Rigid polyisocyanurate board, with a strong white or black fibrous glass facer
 - 1. **EnergyGuard™ Polyiso Insulation** by GAF®,
 - a) Board Thickness:
 - b) Thermal Resistance (LTTR value) of:
 - c) Compressive Strength: 20 PSI, meets ASTM C1289, Type II, Class 1, Grade 2*.
 - 2. **EnergyGuard™ Tapered Polyiso Insulation** by GAF®,
 - a) Board Thickness: tapered
 - b) Thermal Resistance (LTTR value) of:
 - c) Compressive Strength: 20 PSI, meets ASTM C1289, Type II, Class 1, Grade 2*.
- B. Non-halogenated rigid polyisocyanurate board, with glass-reinforced cellulosic felt containing no hazardous halogenated flame-retardant chemicals and conforming to or exceeding the requirements of ASTM C 1289,
 - 1. **EnergyGuard™ NH Polyiso Insulation** by GAF®,
 - a) Board Thickness:
 - b) Thermal Resistance (LTTR value) of:
 - c) Compressive Strength: 20 PSI, meets ASTM C1289, Type II, Class 1, Grade 2*.
 - 2. **EnergyGuard™ NH Tapered Polyiso Insulation** by GAF®,
 - a) Board Thickness: tapered
 - b) Thermal Resistance (LTTR value) of:
 - c) Compressive Strength: 20 PSI, meets ASTM C1289, Type II, Class 1, Grade 2*.
- C. Red List Free certified, holding both an Environmental Product Declaration (EPD) and a Health Product Declaration (HPD) coated glass-fiber bonded to a core of isocyanurate foam meeting the requirements of ASTM D3273 for resistance to mold growth, **EnergyGuard™ Barrier Polyiso Roof Insulation** by GAF®.
 - 1. Board Thickness:
 - 2. Thermal Resistance (LTTR value) of: >20
 - 3. **Compressive Strength: 20 PSI, meets ASTM C1289, Type II, Class 1, Grade 2*.**

GAF® EVERGUARD® TPO SPECIFICATION

- D. Non-halogenated Red List Free certified, holding both an Environmental Product Declaration (EPD) and a Health Product Declaration (HPD) coated glass-fiber bonded to a core of isocyanurate foam containing no hazardous halogenated flame-retardant chemicals meeting the requirements of ASTM D3273 for resistance to mold growth, **EnergyGuard™ NH Barrier Polyiso Roof Insulation** by GAF®.
1. Board Thickness:
 2. Thermal Resistance (LTTR value) of: >20
 3. **Compressive Strength: 20 PSI, meets ASTM C1289, Type II, Class 1, Grade 2*.**
- E. Rigid polyisocyanurate foam insulation with 1/2" perlite roof insulation laminated to one side and a strong fibrous glass facer on the other; conforms to or exceeds the requirements of ASTM C 1289 / FS HH-I-1972. **EnergyGuard™ Composite Insulation**, by GAF®.
1. Board Thickness:
 2. Thermal Resistance (LTTR value) of:
 3. Lamination:
 - a) **1/2" cellulose fiber board**
- F. UltraShield™ coated glass-fiber mat facer laminated to a closed-cell polyisocyanurate foam core, ,
1. **EnergyGuard™ Ultra Polyiso Insulation** by GAF®.
 - a) Board Thickness:
 - b) Thermal Resistance (LTTR value) of:
 - c) **Compressive Strength: 20 PSI, meets ASTM C1289, Type II, Class 1, Grade 2*.**
 2. **EnergyGuard™ Ultra Tapered Polyiso Insulation** by GAF®.
 - a) Board Thickness:
 - b) Thermal Resistance (LTTR value) of:
 - c) **Compressive Strength: 20 PSI, meets ASTM C1289, Type II, Class 1, Grade 2*.**
- * Stated Dimensional Stability Tolerance: Board thickness shall not diminish by more than 2% max*
- G. Non-halogenated UltraShield™ coated glass-fiber mat facer laminated to a closed-cell polyisocyanurate foam core, containing no hazardous halogenated flame-retardant chemicals and meets ASTM C1289, Type II, Class 2, Grade 2*,
1. **EnergyGuard™ NH Ultra Polyiso Insulation** by GAF®.
 - a) Board Thickness:
 - b) Thermal Resistance (LTTR value) of:
 - c) **Compressive Strength: 20 PSI, meets ASTM C1289, Type II, Class 1, Grade 2*.**
 2. **EnergyGuard™ NH Ultra Tapered Polyiso Insulation** by GAF®.
 - a) Board Thickness:
 - b) Thermal Resistance (LTTR value) of:
 - c) **Compressive Strength: 20 PSI, meets ASTM C1289, Type II, Class 1, Grade 2*.**
- * Stated Dimensional Stability Tolerance: Board thickness shall not diminish by more than 2% max*
- H. Expanded perlite mineral aggregate board conforming to or exceeding the requirements of FS HH-I-529b, ANSI/ASTM C 728.
1. **EnergyGuard™ Perlite**, with the following characteristics:
 2. **EnergyGuard™ Tapered Perlite**, with the following characteristics:
 - a) Board Density: 9-lb. per cu. ft. min.
 - b) Board Thickness:
 - c) Thermal Resistance (R value) of:
- I. Expanded Polystyrene Board

GAF® EVERGUARD® TPO SPECIFICATION

**A separation mat or cover board must be installed over this insulation prior to installing an EverGuard® TPO roof membrane.*

1. **ASTM C-578 Type II, recover board (EPS)**, with the following characteristics:

- a) Compressive Strength: 15 psi minimum
- b) Board Density: 1.35 lbs. per cubic foot. minimum

2. **ASTM C-578 Type IX, High density (EPS)**, with the following characteristics:

- a) Compressive Strength: 25 psi nominal
- b) Board Density: 1.8 lbs. per cubic foot. minimum

3. **ASTM C-578 Type X, (XPS)**, with the following characteristics:

- a) Compressive Strength: 15 psi minimum
- b) Board Density: 1.3 lbs. per cubic foot. Minimum

4. Board Thickness:

5. Thermal Resistance (R value) of:

J. Fan Fold Polystyrene Board

**A separation mat or cover board must be installed over this insulation prior to installing an EverGuard® TPO roof membrane.*

1. **ASTM C-578 Type X, 3/8" fan-fold board (XPS)**, with the following characteristics:

- a) Compressive Strength: 15 psi minimum
- b) Board Density: 1.3 lbs. per cubic foot. minimum
- c) Board Thickness: 3/8" (5mm)
- d) Thermal Resistance (R value) of: 1.5

- K. Overlayment board made of cellulose fiber conforming to or exceeding the requirements of FS LLL-I-535, Class C, ANSI/ASTM C 208, with the following characteristics:

1. Board Thickness: 1/2"
2. Thermal Resistance (R value) of: 1.32

2.04 ROOF BOARD

- A. Underlayment or overlayment board with a water-resistant and silicone treated gypsum core with glass fiber facers embedded on both sides, and pre-primed on one side. **GP Dens-Deck® Prime Roof Board**, distributed by GAF®.

1. Board Thickness:
2. Thermal Resistance (R value) of:

- B. Underlayment or overlayment board with a water-resistant and silicone treated gypsum core with glass fiber facers embedded on both sides. **GP Dens-Deck® Roof Board**, distributed by GAF®

1. Board Thickness:
2. Thermal Resistance (R value) of:

- C. Underlayment or overlayment board with a water-resistant and silicone treated gypsum core with glass fiber facers embedded on both sides and a factory-applied low perm, integrated, durable coating that enhances bond strength of the membrane system. **GP Dens-Deck® DuraGuard™ Roof Board**, distributed by GAF®

1. Board Thickness:
2. Thermal Resistance (R value) of:

2.05 ROOF COVER BOARD/RECOVER BOARD

- A. High-density polyisocyanurate cover board, with a coated glass facers on both major surfaces of the core foam meets ASTM C1289, Type II, Class 4, Grade 2.

GAF® EVERGUARD® TPO SPECIFICATION

1. **EnergyGuard™ HD Polyiso Insulation** by GAF®,
 - a) Board Thickness: ½" or 12.7mm
 - b) Minimum Compressive Strength: 80psi (551kPa)
 - c) Thermal Resistance (LTTR value) of: >2.5
 - d) Recycle Content: Max 8%
2. **EnergyGuard™ HD PLUS Polyiso Insulation**, by GAF®
 - a) Board Thickness: ½" or 12.7mm
 - b) Minimum Compressive Strength: 110psi (758 kPa)
 - c) Thermal Resistance (LTTR value) of: >2.5
 - d) Recycle Content: Max 8%

** Stated Dimensional Stability Tolerance: Board thickness shall not diminish by more than 2% max*

- B. Non-halogenated high-density polyisocyanurate cover board, with a coated glass facers on both major surfaces of the core foam containing no hazardous halogenated flame-retardant chemicals and meets ASTM C1289, Type II, Class 4, Grade 2.

1. **EnergyGuard™ NH HD Polyiso Insulation** by GAF®,
 - a) Board Thickness: ½" or 12.7mm
 - b) Minimum Compressive Strength: 80psi (551kPa)
 - c) Thermal Resistance (LTTR value) of: >2.5
 - d) Recycle Content: Max 8%
2. **EnergyGuard™ NH HD PLUS Polyiso Insulation**, by GAF®
 - a) Board Thickness: ½" or 12.7mm
 - b) Minimum Compressive Strength: 110psi (758 kPa)
 - c) Thermal Resistance (LTTR value) of: >2.5
 - d) Recycle Content: Max 8%

** Stated Dimensional Stability Tolerance: Board thickness shall not diminish by more than 2% max*

- C. Expanded perlite mineral aggregate board conforming to or exceeding the requirements of FS HH-I-529b, ANSI/ASTM C 728.

1. **EnergyGuard™ Perlite**, with the following characteristics:
2. **EnergyGuard™ Tapered Perlite**, with the following characteristics:
 - a) Board Density: 9-lb per cu. ft. min.
 - b) Board Thickness:
 - c) Thermal Resistance (R value) of:

- D. Fiber-reinforced gypsum panel with an integral water-resistant core. **Securock®** Roof Board by US Gypsum.

1. Board Thickness: ¼"
2. Thermal Resistance (R value) of: .20

- E. High-density fiberboard roof insulation with unique, patent-pending, non-asphaltic primed red coating that allows for a solid membrane bond and meets ASTM C208, Type II, Grade 1 and Grade 2,

- STRUCTODEK® HD Fiberboard** by Blue Ridge FiberBoard®
- a) Compressive Strength: 15 lbf/in² (103 kPa) minimum
 - b) Board Thickness: 1/2" 1"
 - c) Thermal Resistance (R value) of: 1.3 (for 1/2") 2.5 (for 1")

2.06 SEPARATION SHEET

- A. Fire Resistant non-woven fiberglass slip sheet used as a separation sheet over polystyrene foam insulation or beneath insulation over wood substrates providing a UL class A fire rating. Each roll contains ten (10) squares (1,000 sq. ft.) of material, 6' x 166.7' (1.83m x 50.8m), 110 lbs nominal weight, **VersaShield™ Solo®** Fire Resistant Slip Sheet by GAF®.

GAF® EVERGUARD® TPO SPECIFICATION

- B. Fire resistant glass fiber mat used as a separation sheet over polystyrene foam insulation or beneath insulation over wood substrates. Each roll contains ten (10) squares (1,000 sq. ft.) of material, 4' x 250' (1.2m x 76.9m), 80 lbs. (36.4 kg), **Fiberglass Fire Sheet 10** by GAF®
- C. Fire resistant glass fiber mat used as a separation sheet over polystyrene foam insulation or beneath insulation over wood substrates. Each roll contains four (4) squares (420 sq. ft.) of material, 4' x 105' (1.2m x 32.3m), 79 lbs. (35.9 kg), **Fiberglass Fire Sheet 50** by GAF®
- D. Non-woven polyester UV-stabilized mat, 3 oz. per sq. yd. used as a separation sheet beneath membranes as a protection layer and used over membranes in ballast applied assemblies. Each roll contains thirty (30) squares (3,000 sq. ft.) of material, 10' x 300' (3.07m x 92.3m), 75 lbs. (34.1 kg), **EverGuard® Poly Separation Layer 3 oz.** by GAF®.
- E. Non-woven polyester UV-stabilized mat, 6 oz. per sq. yd. used as a separation sheet beneath membranes as a protection layer and used over membranes in ballast or paver applied assemblies. Each roll contains thirty (30) squares (3,000 sq. ft.) of material, 10' x 300' (3.07m x 92.3m), 125 lbs. (56.8 kg), **EverGuard® Poly Cushioning Layer 6 oz.** by GAF®.

2.07 MEMBRANE MATERIALS

- A. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved.
 - 1. **EverGuard® TPO** by GAF®.
 - a) Thickness: **80mil**
 - b) Full Sheet size:
 - i) **12' x 100, 1200 sq.ft**
 - ii) **10' X 100', 1000 sq.ft.**
 - iii) **8 x 100, 800 sq. ft.**
 - c) Half sheet size:
 - i) **6' x 100, 600 sq.ft.**
 - ii) **5' x 100', 500 sq.ft.**
 - d) Color:
 - i) **White - Energy Star Listed, CRRC Listed and Title 24 Compliant.**

2.08 FLASHING MATERIALS

- A. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved.
 - 1. **EverGuard® TPO** by GAF®.
 - a) Thickness: **80mil**
 - b) Full Sheet size:
 - i) **12' x 100, 1200 sq.ft**
 - ii) **10' X 100', 1000 sq.ft.**
 - iii) **8 x 100, 800 sq. ft.**
 - c) Half sheet size:
 - i) **6' x 100, 600 sq.ft.**
 - ii) **5' x 100', 500 sq.ft.**
 - d) Color:
 - i) **White - Energy Star Listed, CRRC Listed and Title 24 Compliant.**

2.09 ADHESIVES, SEALANTS and PRIMERS

GAF® EVERGUARD® TPO SPECIFICATION

- A. Sprayable solvent-based adhesive for smooth TPO: **EverGuard® TPO Quick Spray Adhesive**, by GAF®.
- B. Low VOC Sprayable solvent-based adhesive for smooth TPO: **EverGuard® TPO Quick Spray Adhesive LV50**, by GAF®.
- C. Water-based Bonding Adhesive: Water based rubberized adhesive for use with EverGuard® TPO membranes, **EverGuard® WB181 Bonding Adhesive**, by GAF®.
- D. Solvent-based bonding adhesive for use with smooth TPO membranes, **EverGuard® 1121 Bonding Adhesive**, by GAF®.
- E. Low VOC solvent-based bonding adhesive for use with smooth TPO membranes, **EverGuard® Low VOC Bonding Adhesive**, by GAF®.
- F. Low VOC solvent-based bonding adhesive covering 3 squares per pail for use with smooth TPO membranes, **EverGuard® TPO 3 square Low VOC Bonding Adhesive**, by GAF®.
- G. Two-part low rise polyurethane foam adhesive for use with insulation and fleece-back membranes, **Oly-Bond 500™ Roofing Adhesive - Equipment-Free Canister** by GAF®.
- H. Solvent based primer for preparing surfaces to receive butyl based adhesive tapes, **EverGuard® TPO Primer**, by GAF®.
- I. Low VOC solvent based primer for preparing surfaces to receive butyl based adhesive tapes, **EverGuard® TPO Low VOC Primer**, by GAF®.
- J. Solvent based seam cleaner used to clean exposed or contaminated seam prior to heat welding, **EverGuard® TPO Seam Cleaner**, by GAF®.
- K. Low VOC solvent based cleaner used to clean exposed or contaminated seam prior to heat-welding or priming, **EverGuard® CleanWeld™ Conditioner**, by GAF®.
- L. Solvent based, trowel grade synthetic elastomeric sealant. Durable and UV resistant suitable for use where caulk is typically used. Available in 10 oz. tubes, **FlexSeal™ Caulk Grade Sealant** by GAF®.
- M. Commercial grade roofing sealant suitable for sealing the upper lip of exposed termination bars and penetrations and around clamping rings and comes with a 20 yr. ltd warranty against leaks caused by manufacturing defects. Meets the performance criteria of ASTM D412, ASTM D2196, ASTM D1475 and ASTM D1644, **FlexSeal™ Roof Sealant**, by GAF®.
- N. One-part moisture cure, self-leveling sealant designed for use in pitch pans **EverGuard® One-Part Pourable Sealer** by GAF®.
- O. One part butyl based high viscosity sealant suitable for sealing between flashing membrane and substrate surface behind exposed termination bars and for sealing between roofing membrane and drain flange. **EverGuard® Water Block**, by GAF®.
- P. Solvent based liquid, required to protect field cut edges of EverGuard® TPO membranes. Applied directly from a squeeze bottle, **EverGuard® TPO Cut Edge Sealant**, by GAF®.

GAF® EVERGUARD® TPO SPECIFICATION

- Q. Insulation Adhesive: **Oly-Bond 500™** distributed by GAF®.
- R. Insulation Adhesive: **Oly-Bond 500™ Spot Shot** distributed by GAF®.

2.10 PLATES & FASTENERS

- A. **Drill•Tec™ Standard Screws:** Standard duty alloy steel insulation fastener with CR-10 coating with a .215" diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips head for use on steel and wood decks.
- B. **Drill•Tec™ ASAP® 3P Fastener:** Assembled screw and 3" locking plastic plate. Alloy steel fastener with CR-10 coating with a .215" diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head.
- C. **Drill•Tec™ ASAP® 3S Fastener:** Assembled screw and 3" steel plate. Alloy steel fastener with CR-10 coating with a .215" diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head.
- D. **Drill•Tec™ Polymer GypTec™ Fastener:** Glass-filled nylon auger with 1" (25.4 mm) with major thread diameter of .675. To be used with 3" steel plate for insulation and 2" steel plate for single-ply membranes. Miami Dade and Factory Mutual Standard 4470 approved (for insulation attachment)
- E. **Drill•Tec™ HD Screws:** Heavy gauge alloy steel fastener with CR-10 coating with a .245" diameter thread. Miami Dade and Factory Mutual Standard 4470 Approved, #3 Phillips truss head for use on wood, concrete and steel decks.
- F. **Drill•Tec™ XHD Screws:** Heavy gauge alloy steel fastener with CR-10 coating with a .275" diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head for use on heavy steel decks, O.S.B or aluminum roof decks.
- G. **Drill•Tec™ SXHD Screws:** Heavy gauge alloy steel fastener with CR-10 coating with a .320" diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head for use on specific FM assemblies on heavy steel decks.
- H. **Drill•Tec™ Lite-Deck Fastener:** A large diameter reinforced nylon screw with a #3 square drive flat head. Thread diameter of .375" and shank diameter of .312". Uses a 3" (76 mm) Metal Round Plate fastening system.
- I. **Drill•Tec™ CR Base Sheet Fastener:** G-90 galvanized, CR-10 Corrosion resistant coating with 1.125" x 1" (25.4 mm) head and 1 3/4" (44 mm) leg length. Preassembled with 2 3/4" (70 mm) diameter Galvalume steel roof disc.
- J. **Drill•Tec™ CR 1.2 Base Sheet Fastener:** G-90 galvanized, CR-10 Corrosion resistant coating with 1.125" x 1" (25.4 mm) head and 1.2" leg length. Preassembled with 2 3/4" (70 mm) Diameter Galvalume steel roof disc.
- K. **Drill•Tec™ Purlin Fastener:** Alloy steel fastener with CR-10 coating with a .210" diameter thread. Factory Mutual Standard 4470 Approved, 1/4" hex head. For use when mechanically fastening single-ply membranes in metal-retrofit applications.
- L. **Nail-Tite Type-R Fasteners:** Self-locking one-piece fastener for securing base ply when roofing over existing poured gypsum roof decks. Shank: 1" (25.4 mm) tapered cone precision formed from corrosion resistant galvanized (G-90) steel. Cap: 1-1/4" round cap formed from corrosion resistant Galvalume (AZ-55) steel, reinforced to resist cupping during driving. The shank is securely wedged to cap forming rigid one-piece fastener, by E. S. Products.
- M. **Drill•Tec™ AccuTrac Insulation Plates:** Galvalume coated steel 3" square plates recessed or flat bottom. Miami Dade and Factory Mutual Standard 4470 Approved and suitable for use with Drill•Tec™ standard fasteners, Drill•Tec™ heavy duty fasteners, Drill•Tec™ extra heavy duty fasteners. Made for east use with Drill•Tec™ AccuTrac stand up tool
- N. **Drill•Tec™ Accuseam Plates:** Galvalume coated steel 3" diameter plates. Miami Dade and Factory Mutual Standard 4470 Approved and suitable for use with Drill•Tec™ Philips head fasteners and Drill•Tec™ extra heavy duty fasteners. Made for east use with Drill•Tec™ AccuTrac stand up tool

GAF® EVERGUARD® TPO SPECIFICATION

- O. **Drill•Tec™ Insulation Plates:** Galvalume, 3" (76 mm) diameter, suitable for use with Drill•Tec™ Standard and HD screws, and Drill•Tec™ Spikes. Special design available for use with Drill•Tec™ Polymer Screws.
- P. **Drill•Tec™ XHD Plates:** Galvalume, 2 3/8" (60 mm) diameter, with a barbed underside. Suitable for use with Drill•Tec™ Standard, HD, and XHD Screws, and Drill•Tec™ Spikes.
- Q. **Drill•Tec™ SXHD Plates:** Galvalume, 2 3/4" (70 mm) diameter, with a double barbed underside. Required for use with Drill•Tec™ SXHD Screws, HD Screws and Drill•Tec™ Spikes for specific FM assemblies.
- R. **Drill•Tec™ SHD Plates:** Galvalume, 2" (52 mm) diameter, with a double barbed underside. Suitable for use with Drill•Tec™ Standard, HD, XHD, and SXHD Screws, and Drill•Tec™ Spikes.
- S. **Drill•Tec™ Lite-Deck Plate:** Galvalume, plate with extra wide diameter designed specifically for Lite-Deck Fastener.
- T. **Drill•Tec™ Locking Impact Nail:** Factory Assembled, G-90 Galvalume Coated fastener designed to install base sheets or insulation to gypsum or cementitious wood fiber. 1.8" to 4.8" lengths available with a 2.7" diameter plate.

2.11 NAILS & SPIKES

- A. **DRILL-TEC™ CD-10:** Hammer-in, non-threaded fastener designed to secure insulation and membrane to structural concrete. Miami Dade and Factory Mutual Standard 4470 approved
- B. **DRILL-TEC™ Spikes:** Hammer-in, non-threaded fastener designed to secure insulation and membrane to structural concrete. Alloy steel fastener with a CR-10 coating and a .250 shank diameter.
- C. **DRILL-TEC™ Masonry Anchor:** Zinc alloy anchor with stainless steel or zinc plated steel pin available in either 1/4" or 3/16" diameter. Designed to attach termination bars to concrete or masonry walls.
- D. **Threaded Cap Nail:** Annular-threaded electro-galvanized with yellow di-chromate coating, with 1" (25.4 mm) round or square cap, as manufactured by the Simplex Nail Corporation.
- E. **Two-Piece Tube Nail:** 1" diameter cap; when the nail is driven down through the tube of first part that was installed, the nail hooks up to provide back out resistance, as manufactured by The Simplex Corporation

2.12 PAVERS

- A. Extruded polystyrene insulation panels with an integral latex-molded mortar top face. Nominal 2" thick insulated pavers to be provided with tongue and groove interlocking edges.

2.13 ACCESSORIES

A. GENERAL FLASHING ACCESSORIES

1. A smooth type, unreinforced thermoplastic polyolefin based membrane for use as an alternative flashing/reinforcing material for penetrations and corners. Required whenever preformed vent boots cannot be used, available in White, Tan, Gray, Regal Red, Regal Blue, and Hartford Green, 0.055 inches (55 mils) nominal thickness and sheet size: 24in x 50ft. **EverGuard® TPO Detailing Membrane**, by GAF®.
2. An 8 inch (203 mm) wide smooth type, polyester scrim reinforced thermoplastic polyolefin membrane strip for use as a cover strip over coated metal and stripping-in coated metal flanges and general repairs: 0.045 inches (45 mils) nominal thickness with 100 foot length, available in White, Tan, Gray, Regal Red, Regal Blue, and Hartford Green **EverGuard® TPO Flashing Membrane**, by GAF®.

GAF® EVERGUARD® TPO SPECIFICATION

3. Extruded aluminum termination bar with angled lip caulk receiver and lower leg bulb stiffener. Pre-punched slotted holes at 6" on center or 8" on center. ¾" x 10' with 0.090" cross section, **DRILL-TEC™ Termination Bar**, by GAF®.
4. 25 mil TPO membrane laminated to galvanized sheet metal for fabrication into metal gravel stop and drip edge profiles, metal base and curb flashings, sealant pans, and scupper sleeves. **EverGuard® TPO Coated Metal**, by GAF®.
 - a) Metal type: 24 gauge, 20 gauge Aluminum Stainless steel
 - b) Sheet per pallet: 5 10 30
 - c) Sheet Size: 4' x 10' Custom size
 - d) Sheet Color:
 - i) Stock Colors: White Gray Tan Energy Gray, Energy Tan

B. ROOF EDGE ACCESSORIES

1. A 6 inch (152 mm) wide, 0.045 mil reinforced TPO membrane with a 3-inch self-adhered area and a 3-inch heat-weld area. Designed for use as a cover strip over coated and non-coated metal edges and flanges. Each full roll contains approximately 100 Lineal Ft. of material, 6" X 100'. **EverGuard® TPO Cover Tape Heat-Weld**, by GAF®.
2. A 6 inch (152 mm) wide, smooth type, polyester scrim reinforced thermoplastic polyolefin membrane strip with a factory laminated butyl tape. Designed for use as a cover strip over non-coated metal edges and flanges. Each full roll contains approximately 100 Lineal Ft. of material, 6" X 100'. **EverGuard® TPO Cover Tape**, by GAF®.
3. Two-part assembly with a continuous cleat and a formed high-quality KYNAR 500® finish cover tested per ANSI/SPRI/FM4435/ES-1. The system shall have all concealed fasteners with no penetration on horizontal roof surface available in 10' lengths, **EverGuard® Standard Drip Edge** by GAF®.
4. Two part decorative fascia edge metal tested per ANSI/SPRI/FM4435/ES-1. The system shall have all concealed fasteners with no penetration on horizontal roof surface available in 10' lengths,
 - a) 20 gauge galvanized retainer, **EverGuard® EZ Fascia** by GAF®.
 - b) 0.50 aluminum retainer, **EverGuard® EZ Fascia AR** by GAF®.
 - c) 24 gauge galvanized retainer, **EverGuard® EZ Fascia LT** by GAF®.
 - d) Extruded aluminum retainer, **EverGuard® EZ Fascia EX** by GAF®.
5. Decorative metal fascia with continuous galvanized steel spring cant to terminate single-ply roofing at perimeter. The system shall be watertight with concealed splice plates and no exposed fasteners available in 10' lengths, **EverGuard® Snap-on Fascia** by GAF®.
6. 20 gauge galvanized steel box with pre-punched holes and supplied with corrosion-resistant fasteners, **EverGuard Edge Box RI** by GAF®.

C. WALL & CURB ACCESSORIES

1. 045" reinforced TPO membrane with pressure sensitive adhesive, to be installed on horizontal surfaces using plates and fasteners as a base attachment in fully adhered systems. Size 6" x 100', **EverGuard® RTA (Roof Transition Anchor) Strip™**, by GAF®.

GAF® EVERGUARD® TPO SPECIFICATION

2. 55 mil TPO membrane and 24 gauge coated metal prefabricated into standard and custom size thru wall scuppers. Available in two sizes: 4" x 6" x 12" (l x w x d) with a 5.75" x 3.75" opening and 8" x 10" x 12" (l x w x d) with a 9.75" x 7.75" opening, **EverGuard® TPO Scupper**, by GAF®
3. .045" or .060" thick reinforced TPO membrane fabricated corners. Available in four standard sizes to flash curbs that are 24", 36", 48", and 60" in size. Four corners are required to flash the curb, **EverGuard® Corner Curb Wraps**, by GAF®.
4. 0.060" thick molded TPO membrane outside corners of base and curb flashing. Hot-air welds directly to EverGuard® TPO membrane. Size 4" x 4" with 6" flange, **EverGuard® TPO Universal Corners** by GAF®.
5. 0.055" molded TPO membrane inside corners of base and curb flashing. Hot-air welds directly to EverGuard® TPO membrane. Size 6" x 6" x 5.5" high **EverGuard® TPO Preformed Corners** by GAF®.
6. 8" diameter, nominal .050" vacuum formed unreinforced TPO membrane for use in flashing outside corners of base and curb flashings, **EverGuard® TPO Fluted Corner**, by GAF®.

D. PENETRATION ACCESSORIES

1. 0.075" thick molded TPO membrane sized to accommodate most common pipe and conduits, (1" (25.4 mm) to 6" diameter pipes), including square tube. Hot-air welded directly to EverGuard® TPO membrane, supplied with stainless steel clamping rings, **EverGuard® TPO Preformed Vent Boots** by GAF®.
2. 0.045" or 0.60" thick molded TPO membrane preformed boots are split to accommodate most common pipes and conduits and available in three standard sizes, **EverGuard® TPO Split Pipe Boots**, by GAF®.
3. 0.045" or 0.60" thick molded TPO membrane preformed square boots are split to accommodate most common square penetrations and conduits and available in three standard sizes, **EverGuard® TPO Square Tube Wraps**, by GAF®.
4. .070 thick molded penetration pocket to provide structure and foundation for the application of a pourable sealant for a variety of roof penetrations, weldable and 9" x 6" x 4" (l x w x h). **EverGuard® TPO Pourable Sealer Pocket**
5. .055" thick smooth type, unreinforced thermoplastic polyolefin membrane designed for use as a conforming membrane seal over T-joints in 60 and 80 mil membrane applications. **EverGuard® TPO Drain** by GAF®

E. FIELD OF ROOF ACCESSORIES

1. Pre-manufactured expansion joint covers used to bridge expansion joint openings in a roof structure. Fabricated to accommodate all roof to wall and roof to roof applications, made of .060" reinforced TPO membrane, available in 5 standard sizes for expansion joint openings up to 8" wide. **EverGuard® TPO Expansion Joint Covers**, by GAF®

GAF® EVERGUARD® TPO SPECIFICATION

2. .055" thick smooth type, unreinforced thermoplastic polyolefin membrane designed for use as a conforming membrane seal over T-joints in 60 and 80 mil membrane applications.
EverGuard® T-Joint Patches, by GAF®.
3. 1/8" thick extruded and embossed TPO roll 30" x 50', heat welds directly to roofing membrane. Unique herringbone traction surface. Gray in color, **EverGuard® TPO Walkway Rolls**, GAF®.

F. GENERAL FLASHING ACCESSORIES

1. A smooth type, unreinforced thermoplastic polyolefin based membrane for use as an alternative flashing/reinforcing material for penetrations and corners. Required whenever preformed vent boots cannot be used, available in White, 0.055 inches (55 mils) nominal thickness and sheet size: 24in x 50ft. **EverGuard Extreme® TPO Detailing Membrane**, by GAF®.
2. An 8 inch (203 mm) wide smooth type, polyester scrim reinforced thermoplastic polyolefin membrane strip for use as a cover strip over coated metal and stripping-in coated metal flanges and general repairs: 0.045 inches (45 mils) nominal thickness with 100 foot length, available in White, **EverGuard Extreme® TPO Flashing Membrane**, by GAF®.
3. 25 mil TPO membrane laminated to galvanized sheet metal for fabrication into metal gravel stop and drip edge profiles, metal base and curb flashings, sealant pans, and scupper sleeves. **EverGuard Extreme® TPO Coated Metal**, by GAF®.
 - a) Metal type: 24 gauge, 20 gauge Aluminum Stainless steel
 - b) Sheet per pallet: 5 10 30
 - c) Sheet Size: 4' x 10' Custom size
 - d) Sheet Color: White
 - i) Custom colors available

G. WALL & CURB ACCESSORIES

1. .045" reinforced TPO membrane with pressure sensitive adhesive, to be installed on horizontal surfaces using plates and fasteners as a base attachment in fully adhered systems. Size 6" x 100', **EverGuard Extreme® RTA (Roof Transition Anchor) Strip™**, by GAF®.
2. 55 mil TPO membrane and 24 gauge coated metal prefabricated into standard and custom size thru wall scuppers. Available in two sizes: 4" x 6" x 12" (l x w x d) with a 5.75" x 3.75" opening and 8" x 10" x 12" (l x w x d) with a 9.75" x 7.75" opening, **EverGuard Extreme® TPO Scupper**, by GAF®.
3. .045" or .060" thick reinforced TPO membrane fabricated corners. Available in four standard sizes to flash curbs that are 24", 36", 48", and 60" in size. Four corners are required to flash the curb, **EverGuard Extreme® Corner Curb Wraps**, by GAF®.
4. 0.060" thick molded TPO membrane outside corners of base and curb flashing. Hot-air welds directly to EverGuard® TPO membrane. Size 4" x 4" with 6" flange, **EverGuard Extreme® TPO Universal Corners** by GAF®.
5. 0.055" molded TPO membrane inside corners of base and curb flashing. Hot-air welds directly to EverGuard® TPO membrane. Size 6" x 6" x 5.5" high **EverGuard Extreme® TPO Preformed Corners** by GAF®.

GAF® EVERGUARD® TPO SPECIFICATION

6. 8" diameter, nominal .050" vacuum formed unreinforced TPO membrane for use in flashing outside corners of base and curb flashings, **EverGuard Extreme® TPO Fluted Corner**, by GAF®.

H. PENETRATION ACCESSORIES

1. 0.075" thick molded TPO membrane sized to accommodate most common pipe and conduits, (1" (25.4 mm) to 6" diameter pipes), including square tube. Hot-air welded directly to EverGuard® TPO membrane, supplied with stainless steel clamping rings, **EverGuard Extreme® TPO Preformed Vent Boots** by GAF®.
2. 0.045" or 0.60" thick molded TPO membrane preformed boots are split to accommodate most common pipes and conduits and available in three standard sizes, **EverGuard Extreme® TPO Split Pipe Boots**, by GAF®.
3. 0.045" or 0.60" thick molded TPO membrane preformed square boots are split to accommodate most common square penetrations and conduits and available in three standard sizes, **EverGuard Extreme® TPO Square Tube Wraps**, by GAF®.
4. .070 thick molded penetration pocket to provide structure and foundation for the application of a pourable sealant for a variety of roof penetrations, weldable and 9" x 6" x 4" (l x w x h). **EverGuard Extreme® TPO Pourable Sealer Pocket**

I. FIELD OF ROOF ACCESSORIES

1. Pre-manufactured expansion joint covers used to bridge expansion joint openings in a roof structure. Fabricated to accommodate all roof to wall and roof to roof applications, made of .060" reinforced TPO membrane, available in 5 standard sizes for expansion joint openings up to 8" wide. **EverGuard Extreme® TPO Expansion Joint Covers**, by GAF®
2. .055" thick smooth type, unreinforced thermoplastic polyolefin membrane designed for use as a conforming membrane seal over T-joints in 60, 70 and 80 mil membrane applications. **EverGuard Extreme® T-Joint Patches**, by GAF®.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the surfaces and site conditions are ready to receive work.
- B. Verify that the deck is supported and secured.
- C. Verify that the deck is clean and smooth, free of depressions, waves, or projections, and properly sloped to drains, valleys, eaves, scuppers or gutters.
- D. Verify that the deck surfaces are dry and free of ice or snow.
- E. Verify that all roof openings or penetrations through the roof are solidly set, and that all flashings are tapered.

3.02 SUBSTRATE PREPARATION

GAF® EVERGUARD® TPO SPECIFICATION**A. Tear-off**

1. Remove all existing roofing materials to the roof decking, including flashings, metal edgings, drain leads, pipe boots, and pitch pockets, and clean substrate surfaces of all asphalt and adhesive contaminants.
2. Confirm the quality and condition of the roof decking by visual inspection. Fastener pull-out testing must be conducted by the roof fastener manufacturer.
3. Secure all loose decking. Remove and replace all deteriorated decking.
4. Remove abandoned equipment and equipment supports.
5. Confirm that the height of equipment supports will allow the installation of full-height flashings.

B. Steel Deck

1. Metal decks must be a minimum uncoated thickness of 22 gauge (0.8 mm) and shall have a G-90 galvanized finish on all panels. FM requirements may supersede those set forth in this section. Consult the current FM Guide for more information.
2. Decks must comply with the gauge and span requirements in the current Factory Mutual FM Approval Guide and be installed in accordance with Loss Prevention Data Sheet 1-28 or specific FM approval.
3. When re-roofing over steel decks, surface corrosion shall be removed, and repairs to severely corroded areas made. Loose or inadequately secured decking shall be fastened, and irreparable or otherwise defective decking shall be replaced.
4. In all retrofit roof applications, it is required that deck be inspected for defects. Any defects are to be corrected per the deck manufacturer's recommendations prior to the new roof application.
5. Existing metal roof panels' flutes are to be filled with flute filler insulation: EPS, XPS, or polyiso insulation. Flute insulation should fit snugly between seams of the existing metal panels. Flute filler insulation thickness should be equivalent to the height of the metal panel seams

A. Structural Concrete Deck

1. Minimum Min. 2,500 psi compressive resistance (98,066 kilogram-force/square centimeter)
2. The deck must be smooth, level and cannot be wet or frozen. If deck is determined to be wet, it must be allowed to dry.
3. Only poured in place concrete decks that provide bottom side drying are acceptable. Decks that are installed over non-vented metal decks or pans that remain in place may trap moisture in the deck beneath the roof system and are not acceptable.
4. The roof deck shall be properly cured prior to application of the roofing system; twenty-eight (28) days is normally required for proper curing. Curing agents must be checked for compatibility with roofing materials. Prior to the installation of the roof assemblies, GAF® recommends the evaluation of the surface moisture and deck's dryness through the use of ASTM D-4263 or hot bitumen test.
5. Treat cracks greater than 1/8" (3 mm) in width in accordance with the deck manufacturer's recommendations.
6. Sumps for the roof drains shall be provided in the casting of the deck.
7. In all retrofit roof applications, it is required that deck be inspected for defects. Any defects are to be corrected per the deck manufacturer's recommendations prior to the new roof application.
8. For Pre-Cast Concrete Decks
 - a) Minimum 2" (51 mm) deck thickness
 - b) Joints must be filled with a masonry grout to correct imperfections between slabs and feathered to provide a slope not greater than 1/8:12 adhered insulated assemblies.

GAF® EVERGUARD® TPO SPECIFICATION

- c) If the joints cannot be grouted and finished smooth, then a leveling course of lightweight insulating concrete (minimum 2" [51 mm] thickness) must be applied. Do not seal joints between the slabs; leave open to permit venting and drying of the roof fill from below.
- 9. For Pre-Stressed Concrete Decks
 - a) GAF recommends a minimum 2" (51 mm) cellular lightweight concrete fill be installed over all pre-stressed concrete decks prior to installation of the roof system and/or insulation because variations in camber and thickness of pre-stressed concrete members may make securement of the roof system difficult.
 - b) Provisions must be made for the curing or drying of the fill installed over the top of the pre-stressed deck members. Do not seal joints between the slabs; leave open to permit venting and drying of the roof fill from below.
- 10. For Poured Structural Concrete Decks
 - a) Minimum 4" (102 mm) deck thickness
 - b) Must be poured over removable forms or must provide for bottom side drying. Poured-in-place structural concrete decks that are poured over non-vented metal decks or pans that remain in place not acceptable.

3.02 NAILER INSTALLATION

A. Acceptable Material

- 1. Solid Blocking: Non-pressure treated wood as required, #2 Grade or better, nominal 1 1/4" (30 mm) x 4" (102 mm) with a minimum thickness of 3 1/2" (88 mm).
- 2. Shim Material: Plywood, 1/2" (13 mm) x width to match solid blocking.
- 3. Verify the condition of existing roof nailers and anchor to resist 250 lb. per ft. (550 kg) load applied in any direction. New nailers should meet same load requirements.
- 4. DRILL-TEC™ HD screws 18" (457 mm) o.c. attachment to structural wood, steel decks with a 1" (25 mm) thread embedment.
- 5. DRILL-TEC™ spikes or HD screws 18" (457 mm) o.c. attachment to concrete decks. Min. 1" (25 mm) shank or thread penetration.
- 6. Wood nailers attached to gypsum, concrete, cellular concrete and cementitious wood fiber must be fastened 12" (305 mm) o.c., through the nailer into the substrate with substrate approved DRILL-TEC™ fasteners.
- 7. Three anchors per length of wood nailer minimum.

B. Metal Blocking

- 1. 20 Ga. galvanized steel box with pre-punched holes and supplied with corrosion-resistant fasteners.
- 2. Closure and finish strip required for metal decking.
- 3. Secure in place using provided #14 x 1½-in. universal fasteners through pre-punched holes to roof edge.
- 4. Install end cap and top of box section with #14 x 1½-in. universal fasteners.

3.03 INSTALLATION - GENERAL

- A. Install GAF®'s EverGuard® TPO roofing system according to all current application requirements in addition to those listed in this section.

GAF® EVERGUARD® TPO SPECIFICATION

B. GAF® EverGuard® TPO Specification #:

C. Start the application of membrane plies at the low point of the roof or at the drains, so that the flow of water is over or parallel to, but never against the laps.

3.03 AIR/VAPOR BARRIER

A. GENERAL

1. Air/vapor retarder components must typically be installed when required by design professional to address internal building air pressure or humidity conditions on the structural deck or directly over a minimal layer of EnergyGuard™ insulation or fire barrier.
2. EnergyGuard™ insulation must be installed over the vapor retarder to raise the location of the dew point temperature above the level of the vapor retarder.
3. Designers should consider requiring air retarders:
 - a) On all air porous decks, with openings in the walls or area directly below the roof deck that exceeds 10% of the total wall area.
 - b) When the internal pressurization of the building is in excess of 5 lbs. per sq. ft. (239 Pa).
 - c) When the building height exceeds 50 ft. (30.5 m).
 - d) When buildings have large openings or overhangs.
 - e) In conditions where positive internal pressure is applied suddenly, as may be the case at aircraft hangers or distribution centers—otherwise, the roofing system may fail due to pressure impact.
4. Refer to FM Global Loss Prevention Data Sheets 1-28 and 1-29 for specific installation procedures for all roofs with large openings.
5. For roofs to be guaranteed by GAF:
 - a) Air retarders are required for all extended-length guarantees on buildings where large wall openings greater than 10% of the total wall area can be open during a windstorm, including opening due to storm damage.

B. APPLICATION – LOOSE-APPLIED

1. Install air/vapor barrier sheet loose-applied to the deck or fire board so that wrinkles and buckles are not formed.
2. Overlap air/vapor barrier sheets a minimum of 6" for side and end laps. Tape laps together with duct tape or double sided tape.
3. Seal perimeter and penetration areas with foam sealant.
4. Seal all perimeter nailers with adhered roof membrane placed over the nailer and covering the exterior face of the nailer by 1" (25 mm).
5. Install insulation boards over the air/vapor retarder and mechanically attach the boards to the deck.

C. APPLICATION – ADHERED

1. Apply compatible adhesive to the structural deck or fire barrier board per air vapor retarder manufacturers' recommendations.
2. Install the air/vapor retarder components loose applied to the deck or fire barrier board so that wrinkles and buckles are not formed. Broom air/vapor barrier components to ensure embedment into the adhesive.
3. Overlap air/vapor retarder components a minimum of 6" (152 mm) for side and end laps. Adhere laps together with compatible adhesive.
4. Seal perimeter and penetration areas with foam sealant.
5. Install insulation boards over the air/vapor barrier and mechanically attach the boards to the deck or adhere the boards to the air/vapor retarder with compatible adhesive to achieve the desired roof system uplift resistance.

3.04 FIRE BARRIER/PROTECTION LAYER

GAF® EVERGUARD® TPO SPECIFICATION**A. GENERAL**

1. Slip sheet protection layer must typically be installed when required by design professional or code authority to address code or approval requirements.
2. Fire resistant fiberglass sheet protection layer shall typically be installed when required by design professionals or code authority to address code or approval requirements or as a separator layer.
3. Install fiberglass sheet or polymat protection layer loose-applied over substrate surface so that wrinkles and buckles are not formed.
4. Overlap sheets a minimum of 6" (152 mm) for side and end laps.
5. Install VersaShield Solo loose-applied over substrate surface so that wrinkles and buckles are not formed.
6. GAF VersaShield® Solo™ protection layer should be installed perpendicular to the direction of the TPO membrane
7. Overlap membrane a minimum 2" (52 mm) at the side laps and minimum 4" (102 mm) at the end laps.
8. Use corrosive resistant nails with 1" (25.4 mm) diameter metal head or plastic caps to fasten in place. Only use enough fasteners to hold in place until primary roof covering is in place.
9. Do not install more VersaShield Solo than can be covered in one day.
10. The substrate must be clean, dry, and free of foreign matter.
11. Install GAF FireOut™ Fire Barrier coating at an application rate of one gallon per 100 sq. ft. (9.2 sq. m) via spray, brush, or roller.

3.04 INSULATION**A. GENERAL**

1. Do not apply roof insulation or roofing until all other work trades have completed jobs that require them to traverse the deck on foot or with equipment. A vapor retarder coated lightly with asphalt may be applied to protect the inside of the structure prior to the insulation and final roofing installation. Before the application of the insulation, any damage or deterioration to the vapor retarder must be repaired.
2. Do not install wet, damaged or warped insulation boards.
3. Install insulation boards with staggered board joints in one direction (unless taping joint).
4. Install insulation boards snug. Gaps between board joints must not exceed ¼" (6 mm). All gaps in excess of ¼" (6 mm) must be filled with like insulation material.
5. Wood nailers must be 3-1/2" (89 mm) minimum width or 1" (25.4 mm) wider than metal flange. They shall be of equal thickness as the insulation, and be treated for rot resistance. All nailers must be securely fastened to the deck.
6. Do not kick insulation boards into place.
7. Miter and fill the edges of the insulation boards at ridges, valleys and other changes in plane to prevent open joints or irregular surfaces. Avoid breaking or crushing of the insulation at the corners.
8. Insulation should not be installed over new lightweight insulating concrete.
9. Roof tape, if required over insulation joints, must be laid evenly, smoothly and embedded in a uniform coating of hot steep asphalt with 4" (102 mm) end laps. Care must be taken to assure smooth application of tape, and full embedment of the tape in the asphalt.
10. Do not install any more insulation than will be completely waterproofed each day.

B. INSULATION APPLICATION

1. The insulation must be securely attached to the roof deck. A minimum FMRC 1-60 attachment is recommended. Refer to FMRC Approval Guide for FM fastening patterns. Factory Mutual requires fastener density increased in corner areas for FM 1-60 as well as perimeter and corner area fastener density increases for FM 1-90 or greater. Refer to FM Loss Prevention Data Sheets 1-7, 1-28, and 1-49.

GAF® EVERGUARD® TPO SPECIFICATION

2. Use only fasteners with a minimum 3 inch (76 mm) stress plate when mechanically attaching insulation. Do not attach insulation with nails.

3.01 MEMBRANE APPLICATION**A. GENERAL**

1. Substrates must be inspected and accepted by the contractor as suitable to receive and hold roof membrane materials.
2. Place roof membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent securement.
3. Membrane that has been exposed for more than 12 hours or has become contaminated will require additional cleaning methods.
 - a) Light Contamination - Membrane that has been exposed overnight up to a few days to debris, foot traffic, or dew or light precipitation can usually be cleaned with a white cloth moistened with EverGuard® TPO Cleaner (or EverGuard® CleanWeld™ Conditioner, a low-VOC cleaner) for TPO membranes. [For PVC, acetone or MEK \(Methyl Ethyl Ketone\) may be used. Be sure to wait for solvent to flash off prior to welding.](#)
 - b) Dirt-Based Contamination - Membrane that is dirt encrusted will require the use of a low-residue cleaner, such as Formula 409® and a mildly abrasive scrubbing pad to remove the dirt. This must be followed by cleaning with a white cloth moistened with EverGuard® TPO Cleaner (or EverGuard® CleanWeld™ Conditioner) for TPO membranes. [For PVC, acetone or MEK may be used.](#) Be sure to wait for solvent to flash off prior to welding.
 - c) Exposure-Based Contamination - Membrane that is weathered or oxidized will require the use of EverGuard® TPO Cleaner, EverGuard® CleanWeld™ Conditioner, or [acetone for PVC](#) and a mildly abrasive scrubbing pad to remove the weathered/oxidized top surface layer. This must be followed by cleaning with a white cloth moistened with EverGuard® TPO Cleaner (or EverGuard® CleanWeld™ Conditioner) for TPO membranes. [For PVC, acetone or MEK may be used.](#) Unexposed membrane left in inventory for a year or more may need to be cleaned as instructed above. Be sure to wait for solvent to flash off prior to welding.
 - d) Chemical-Based Contamination - Membrane that is contaminated with bonding adhesive, asphalt, flashing cement, grease and oil, and most other contaminants usually cannot be cleaned sufficiently to allow an adequate heat weld to the membrane surface. These membranes should be removed and replaced.

A. MECHANICALLY ATTACHED

1. Full-width rolls must be installed in the field of the roof. Half-width rolls must be installed in the perimeter region of the roof. Width of the roof perimeter region must be determined in accordance with the Perimeter half sheet calculation.

GAF® EVERGUARD® TPO SPECIFICATION

Building Width	Building Height	Number of EverGuard® TPO 60" (1.5 m) Half Sheets	Number of EverGuard® PVC 60" (1.5 m) Half Sheets	Number of EverGuard® TPO 72" (1.83 m) Half Sheets
<200' (61 m)	0-34' (0-10 m)	1	1	1
	35-100' (10-30 m)	2	2	2
	>100' (30 m)	Formula Calculations: Install half sheet throughout the perimeter and corner region. The width of this region is defined as the least of the following two measurements: 0.1 x building width or 0.4 x building height. Note: The minimum perimeter width is 4' (1.2 m). The width is defined as the narrowest dimension.		
≥200' (61 m)	any height			

2. Overlap roof membrane a minimum of 3" (76 mm) for end laps.
3. The membrane shall be mechanically fastened in the side lap area to the roof deck with appropriate DRILL-TEC™ fasteners and plates as required by roof system specification and/or Factory Mutual classification requirements.
4. Best practice is to install membrane so that the side laps run across the roof slope lapped toward drainage points.
5. All exposed sheet corners must be rounded a minimum of 1" (25 mm).
6. Use full-width rolls throughout the field and perimeter of the roof. Half sheets are not necessary.
7. Membrane laps shall be heat-welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns and scorch marks.
8. Weld shall be a minimum of 1" (25.4 mm) in width for automatic machine welding and a minimum 2" in width for hand welding.
9. Roof membrane must be mechanically attached along the base of walls with screws and plates 12" (305 mm) on center
10. Alternatively, membrane may be extended vertically 3" (75 mm) up walls and curbs and secured to the wall/ curb substrate within 2" (51 mm) of the plane of the roof. Use DRILL-TEC™ Fasteners and inverted termination bar of type and spacing in accordance with in-lap attachment requirements, with a 6" (152 mm) o.c. maximum spacing. Vertical attachment with seam plates and fasteners may also be used. This alternative detail is required to be used for pressurized buildings.
11. The metal plates must be placed within ¼" to ½" of the membrane edge. Plates shall not be placed less than ¼" from the membrane edge.
12. In the corner regions, additional fasteners shall be installed through the perimeter membrane to form a grid pattern, with an 8" (305 mm) wide EverGuard® TPO reinforced membrane flashing-strip welded over the additional fasteners. Corners include both outside and inside corners that measure 75 - 105 angle degrees.
13. Membrane attachment to the roof deck is required at locations of deck angle changes in excess of 1:12.
14. In the corner areas, additional fasteners will also be installed through the perimeter half-width membrane rolls to form a grid pattern, with an 8" (203 mm) wide reinforced membrane flashing strip heat-welded over the additional fasteners. "Corners" include both outside and inside corners that measure 75°-105°. Perimeter cap sheets may overlap one another in the corner areas. Alternatively, the half sheet may be laid out in a "picture frame" manner, burying the fasteners under the half sheets.
15. Roof membrane must be mechanically secured at the perimeter, at the base of internal walls and curbs, and at all penetrations with DRILL-TEC™ Membrane Fasteners and Plates at a 12" (305 mm) o.c. maximum spacing.
16. Membrane may be heat welded to coated metal flanges

GAF® EVERGUARD® TPO SPECIFICATION**B. MECHANICALLY ATTACHED METAL RETROFIT SYSTEM**

1. Roof Slope no greater than 2:12 and maximum building height of 40 ft.
2. Overlap roof membrane a minimum of 6" (152 mm) for side laps of mechanically attached systems, and a minimum of 3" (76 mm) for end laps.
3. All exposed sheet corners must be rounded a minimum of 1" (25 mm).
4. The membrane shall be mechanically fastened in the side lap area to the roof deck with appropriate DRILL-TEC™ fasteners and plates as required by roof system specification and/or Factory Mutual classification requirements.
5. Use full-width rolls throughout the field and perimeter of the roof. Half sheets are not necessary.
6. Best practice is to install membrane so that the side laps run across the roof slope lapped toward drainage points. Depending on sheet orientation and placement of the fasteners into the purlins, fasteners may be located in the seams of the membrane or in the field of the sheet. Fasteners not located in the seams should be covered by an 8" (203 mm) wide flashing strip hot air welded to the membrane.
7. Membrane laps shall be heat-welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns and scorch marks
8. Place membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent attachment. Roof membrane shall be mechanically fastened immediately after it is rolled out, followed by welding to adjacent sheets.
9. Weld shall be a minimum of 1" (25.4 mm) in width for automatic machine welding and a minimum 2" (51 mm) in width for hand welding,
10. Roof membrane must be mechanically attached along the base of walls with screws and plates 12" (305 mm) on center
11. Alternatively, membrane may be extended vertically 3" (75 mm) up walls and curbs and secured to the wall/ curb substrate within 2" (51 mm) of the plane of the roof. Use DRILL-TEC™ Fasteners and inverted termination bar of type and spacing in accordance with in-lap attachment requirements, with a 6" (152 mm) o.c. maximum spacing. Vertical attachment with seam plates and fasteners may also be used. This alternative detail is required to be used for pressurized buildings.
12. The metal plates must be placed within ¼" to ½" of the membrane edge. Plates shall not be placed less than ¼" from the membrane edge.
13. In the corner regions, additional fasteners shall be installed through the perimeter membrane to form a grid pattern, with an 8" (305 mm) wide EverGuard® TPO reinforced membrane flashing-strip welded over the additional fasteners. Corners include both outside and inside corners that measure 75 - 105 angle degrees.
14. Membrane attachment to the roof deck is required at locations of deck angle changes in excess of 1:12
15. In the corner areas, additional fasteners will also be installed through the perimeter half-width membrane rolls to form a grid pattern, with an 8" (203 mm) wide reinforced membrane flashing strip heat-welded over the additional fasteners. "Corners" include both outside and inside corners that measure 75°-105°. Perimeter cap sheets may overlap one another in the corner areas. Alternatively, the half sheet may be laid out in a "picture frame" manner, burying the fasteners under the half sheets.
16. Roof membrane must be mechanically secured at the perimeter, at the base of internal walls and curbs, and at all penetrations with DRILL-TEC™ Membrane Fasteners and Plates at a 12" (305 mm) o.c. maximum spacing.
17. Membrane may be heat welded to coated metal flanges.

3.02 FLASHINGS**A. GENERAL**

GAF® EVERGUARD® TPO SPECIFICATION

1. All penetrations must be at least 24" (610 mm) from curbs, walls, and edges to provide adequate space for proper flashing.
2. Flash all perimeter, curb, and penetration conditions with coated metal, membrane flashing, and flashing accessories as appropriate to the site condition.
3. All coated metal and membrane flashing corners shall be reinforced with preformed corners or non-reinforced membrane.
4. Heat-weld all flashing membranes, accessories, and coated metal. A minimum 2" (52 mm) wide hand weld or minimum 1" (25 mm) to 1-1/2" (39 mm) automatic machine weld is required.
5. Consult the EverGuard® *Application and Specifications Manual* or GAF® Technical Support Services for more information on specific construction details, or those not addressed in this section.
6. EverGuard Extreme® flashings and accessories are required for use with EverGuard Extreme® membranes.

B. COATED METAL FLASHINGS

1. Coated metal flashings shall be formed in accordance with current EverGuard® construction details and SMACNA guidelines.
2. Coated metal sections used for roof edging, base flashing and coping shall be butted together with a 1/4" (7 mm) gap to allow for expansion and contraction. Heat-weld a 6" (152 mm) wide reinforced membrane flashing strip to both sides of the joint, with approximately 1" (25.4 mm) on either side of the joint left un-welded to allow for expansion and contraction. 2" (52 mm) wide aluminum tape can be installed over the joint as a bond-breaker, to prevent welding in this area.
3. Coated metal used for sealant pans, scupper inserts, corners of roof edging, base flashing and coping shall be overlapped or provided with separate metal pieces to create a continuous flange condition, and pop-riveted securely. Heat-weld a 6" (152 mm) wide reinforced membrane flashing strip over all seams that will not be sealed during subsequent flashing installation.
4. Provide a 1/2" (13 mm) hem for all exposed metal edges to provide corrosion protection and edge reinforcement for improved durability.
5. Provide a 1/2" (13 mm) hem for all metal flange edges whenever possible to prevent wearing of the roofing and flashing membranes at the flange edge.
6. Coated metal flashings shall be nailed to treated wood nailers or otherwise mechanically attached to the roof deck, wall or curb substrates, in accordance with construction detail requirements.

C. REINFORCED MEMBRANE FLASHINGS

1. The thickness of the flashing membrane shall be the same as the thickness of the roofing membrane.
2. Membrane flashing may either be installed loose or fully adhered to the substrate surface in accordance with "Construction Detail Requirements".
3. Apply the adhesive only when outside temperature is above 40°F. Recommended minimum application temperature is 50°F to allow for easier adhesive application. Water-based adhesives are approved for use with smooth TPO membranes for flashings only.
4. The membrane flashing shall be carefully positioned prior to application to avoid wrinkles and buckles.
5. Please note that solvent-based adhesives must be allowed to dry until tacky to the touch before mating flashing membrane. Water-based adhesive must be allowed to flash off completely.

GAF® EVERGUARD® TPO SPECIFICATION

6. Heat-weld all laps in EverGuard® smooth-reinforced flashing membrane in accordance with heat-welding guidelines. All seams in fleece-back membrane and smooth field sheet must be stripped in with 8" (203 mm) flashing strip.
7. For extended length guarantees, separate counter flashing is required; exposed termination bars are not acceptable

D. UN-REINFORCED MEMBRANE FLASHINGS

1. Un-reinforced membrane is used to field-fabricate penetration or reinforcement flashings in locations where preformed corners and pipe boots cannot be properly installed.
2. Penetration flashings constructed of un-reinforced membrane are typically installed in two sections, a horizontal piece that extends onto the roofing membrane and a vertical piece that extends up the penetration. The two pieces are overlapped and hot-air welded together.
3. Apply the adhesive only when outside temperature is above 40°F. Recommended minimum application temperature is 50°F to allow for easier adhesive application. Water-based adhesives are approved for use with smooth TPO membranes for flashings only
4. The membrane flashing shall be carefully positioned prior to application to avoid wrinkles and buckles.
5. Please note that solvent-based adhesives must be allowed to dry until tacky to the touch before mating flashing membrane. Water-based adhesive must be allowed to flash off completely.

E. ROOF EDGES

1. Roof edge flashings are applicable for gravel stop and drip edge conditions as well as for exterior edges of parapet walls.
2. Flash roof edges with coated metal flanged edging with a minimum 3" (76 mm) wide flange nailed 4" (102 mm) on center to wood nailers, and heat weld 8" (203 mm) membrane strip to metal flanges.
3. When the fascia width exceeds 4" (102 mm), coated metal roof edging must be attached with a continuous cleat to secure the lower fascia edge. The cleat must be secured to the building no less than 12" (305 mm) o.c.
4. Flash roof edge scuppers with a coated metal insert that is mechanically attached to the roof edge and integrated as a part of the metal edging.
5. Alternatively, roof edges may be flashed with a 2-piece snap on fascia system, adhering the roof membrane to a metal cant and face nailing the membrane 8" (152 mm) on center prior to installing a snap-on fascia.
 - a) Submit design drawings for review and approval to Architect or Specifier before fabrication.
 - b) Installing contractor shall check as-built conditions and verify the manufacturer's roof edging details for accuracy to fit the wall assembly prior to fabrication. The installer shall comply with the roof edging manufacturer's installation guide when setting edging.

F. PARAPET AND BUILDING WALLS

1. Flash walls with EverGuard® TPO membrane adhered to the substrate with bonding adhesive, loose applied or with coated metal flashing nailed 4" (102 mm) on center to pressure-treated wood nailers.
2. Maximum flashing height without intermediate fastening is 24" (610 mm) for loose-applied flashing and 54" (1.4 m) for adhered flashing
3. Secure membrane flashing at the top edge with a termination bar. EverGuard® Water Block shall be applied between the wall surface and membrane flashing underneath all exposed termination bars. Exposed termination bars shall be mechanically fastened 6" (152 mm) on center for guarantees less than 20 years and 12" (305 mm) on center for guarantees greater than 20 years or that are counter-flashed.
4. Exposed termination bars must be sealed with Flexseal™ Caulk Grade Sealant.

GAF® EVERGUARD® TPO SPECIFICATION

5. Roof membrane must be mechanically attached along the base of walls with screws and plates 12" (305 mm) on center [6" (152 mm) on center for Ballasted Systems]
6. Metal cap flashings must have continuous cleats or be face fastened 12" (305 mm) o.c. on both the inside and outside of the walls.
7. Flash wall scuppers with a coated metal insert that is mechanically attached to the wall and integrated as part of the wall flashing.

G. CURBS AND DUCTS

1. Flash curbs and ducts with EverGuard® TPO membrane adhered to the curb substrate with bonding adhesive, loose applied or with coated metal flashing nailed 4" on center to pressure-treated wood nailers.
2. Maximum flashing height without intermediate fastening is 24" (610 mm) for loose-applied flashing and 54" (1.4 m) for adhered flashing
3. Secure membrane flashing at the top edge with a termination bar. EverGuard® Water Block shall be applied between the wall surface and membrane flashing underneath all exposed termination bars. Exposed termination bars shall be mechanically fastened 6" (152 mm) on center for guarantees less than 20 years and 12" (305 mm) on center for guarantees greater than 20 years or that are counter-flashed.
4. Exposed termination bars must be sealed with Flexseal™ Caulk Grade Sealant.
5. Roof membrane must be mechanically attached along the base of walls with screws and plates 12" (305 mm) on center [6" (152 mm) on center for Ballasted Systems]
6. Metal counterflashing may be optional with fully adhered flashings depending on guarantee requirements. Exposed termination bars must be sealed with Flexseal™ Roofing Cement.
7. All coated metal curb flashings and loose applied membrane flashings must be provided with separate metal counterflashings, or metal copings

H. ROOF DRAINS

1. Roof drains must be fitted with compression type clamping rings and strainer baskets. Original-type cast iron and aluminum drains, as well as retrofit-type cast iron, aluminum or molded plastic drains are acceptable.
2. Roof drains must be provided with a minimum 36" x 36" (914 mm x 914 mm) sump if applicable. Slope of tapered insulation within the sump shall not exceed 4" in 12".
3. Extend the roofing membrane over the drain opening. Locate the drain and cut a hole in the roofing membrane directly over the drain opening. Provide a ½" (13 mm) of membrane flap extending past the drain flange into the drain opening. Punch holes through the roofing membrane at drain bolt locations.
4. For cast iron and aluminum drains, the roofing membrane must be set in a full bed of FlexSeal™ Caulk Grade Sealant on the drain flange prior to securement with the compression clamping ring. Typical application is one 10.5 ounce cartridge of FlexSeal™ Caulk Grade Sealant per drain.
5. Lap seams shall not be located within the sump area. Where lap seams will be located within the sump area, a separate smooth membrane drain flashing a minimum of 12" (305 mm) larger than the sump area must be installed. The membrane flashing must be heat-welded to the roof membrane. Alternately, if the seam does not run under the clamping ring, it can be covered with a 6" (152 mm) wide reinforced-membrane strip heat-welded to the membrane.
6. Tighten the drain compression ring in place.

I. EXPANSION JOINTS

1. Any prefabricated expansion joint metal nailing strips must be fastened to wood nailers, curbs or secured to walls with appropriate nails or EverGuard® DRILL-TEC™ Fasteners.
2. Roof membrane must be mechanically attached along the base of raised curb-expansion joints with screws and plates a minimum of 12" (305 mm) o.c. The expansion joint cover bellows shall be at least 2 times the expansion joint opening.

GAF® EVERGUARD® TPO SPECIFICATION

3. Metal nailing strip must be set in FlexSeal™ Caulk Grade Sealant and secured with fasteners and neoprene washers fastened 6" (152 mm) o.c
4. Expansion joints may be field fabricated. Reference appropriate Construction Detail.

J. SCUPPERS

1. Coated-metal roof-edge scuppers must be provided with a min. 4" (102 mm) wide flange nailed to wood nailers, with hemmed edges and secured with continuous clips in accordance with the gravel stop assembly.
2. Coated-metal wall scuppers must be provided with 4" (102 mm) wide flanges, with additional corner pieces pop-riveted to the flanges to create a continuous flange. All flange corners must be rounded.
3. Install wall scuppers over the roof and flashing membrane and secure to the roof deck/wall with DRILL-TEC™ Fasteners 6" (152 mm) o.c., a minimum of 2 fasteners per side.
4. All corners must be reinforced with EverGuard® PVC or EverGuard® TPO Universal Corners or field-fabricated from EverGuard® non-reinforced materials.
5. Strip-in scupper with flashing membrane target sheet.
6. Alternately, a wall scupper box may be field-flashed using non-reinforced flashing membrane heat-welded to membrane on the wall face and roof deck. Fully adhere to the scupper box and terminate on the outside wall face with a termination bar and FlexSeal™ Caulk Grade sealant.
7. EverGuard® TPO has prefabricated scuppers in standard and custom sizes available.

K. WOOD SUPPORT BLOCKING

1. Wood support blocking, typically 4" x 4" (102 mm x 102 mm), is usually installed under light-duty or temporary roof-mounted equipment, such as electrical conduit, gas lines, condensation and drain lines.
2. Install wood support blocking over a protective layer of EverGuard® TPO walkway rolls or PVC walkway pads. Place wood blocking on oversized slip sheet, fold two sides vertically, and fasten with roofing nails into the blocking.

3.03 TRAFFIC PROTECTION

- A. Install walkway pads at all roof access locations and other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.
- B. Walkway rolls or pads must be spaced 6" (152 mm) apart to allow for drainage between the pads.
- C. Heat-weld walkway rolls or pads to the roof membrane surface continuously around the perimeter of the pad/roll.

3.04 ROOF PROTECTION

- A. Protect all partially and fully completed roofing work from other trades until completion.
- B. Whenever possible, stage materials in such a manner that foot traffic is minimized over completed roof areas.
- C. When it is not possible to stage materials away from locations where partial or complete installation has taken place, temporary walkways and platforms shall be installed in order to protect all completed roof areas from traffic and point loading during the application process.
- D. Temporary tie-ins shall be installed at the end of each workday and removed prior to commencement of work the following day.

GAF® EVERGUARD® TPO SPECIFICATION**3.05 CLEAN-UP**

- A. All work areas are to be kept clean, clear and free of debris at all times.
- B. Do not allow trash, waste, or debris to collect on the roof. These items shall be removed from the roof on a daily basis.
- C. All tools and unused materials must be collected at the end of each workday and stored properly off of the finished roof surface and protected from exposure to the elements.
- D. Dispose of or recycle all trash and excess material in a manner conforming to current EPA regulations and local laws.
- E. Properly clean the finished roof surface after completion, and make sure the drains and gutters are not clogged.
- F. Clean and restore all damaged surfaces to their original condition.

3.06 MAINTENANCE

- A. Inspections to the roof shall be performed annually by a GAF® **Master Select™** contractor.
- B. An annual roofing system maintenance program shall be performed by a Master **Select™** contractor in accordance with GAF®'s 10 Point Maintenance Program provided with your Diamond Pledge™ guarantee.
- C. Submit copies of the roof inspection form, accompanying photographs (a minimum of 6 photos showing the condition of the roof and critical details), and a record of all roofing system maintenance to the GAF® Technical Support Services Department within sixty (60) days of the anniversary date of the completion of the roofing system. Annual roof inspections must be started within the first two (2) years of the guarantee term.

END OF SECTION

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and color Samples.
- B. Coordinate installation of sheet metal flashing and trim with adjoining roofing and wall materials, joints, and seams to provide a leakproof, secure, and noncorrosive installation.
- C. Warranty on Finishes: Manufacturer agrees to repair or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 10 years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Standard: Comply with NRCA's "The NRCA Roofing Manual" SMACNA's "Architectural Sheet Metal Manual" and CDA's "Copper in Architecture Handbook" unless otherwise indicated. Conform to dimensions and profiles shown unless more stringent requirements are indicated.

2.2 SHEET METAL

- A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, not less than 0.032 inch (0.8 mm) thick; finished as follows:
 - 1. Finish: Manufacturer's standard two-coat fluoropolymer system with color coat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.
 - 2. Concealed Finish: Manufacturer's standard white or light-colored acrylic or polyester backer finish.
- B. Zinc-Tin Alloy-Coated Stainless Steel: ASTM A 240/A 240M, Type 304, fully annealed stainless-steel sheet, not less than 0.015 inch (0.38 mm) thick, with 0.787-mil (0.020-mm) thickness zinc-tin alloy coating applied to each side; with factory-applied gray preweathering.

2.3 ACCESSORIES

- A. Felt Underlayment: ASTM D 226, Type II (No. 30) or Type I (No. 15), asphalt-saturated organic felts.
- B. Self-Adhering, High-Temperature Sheet Underlayment: Butyl or SBS-modified asphalt; slip-resisting-polyethylene surfaced; with release paper backing; cold applied. Stable after testing at 240 deg F (116 deg C) and passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.

- C. Slip Sheet: Rosin-sized building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum.
- D. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners.
 - 1. Exposed Fasteners: Heads matching color of sheet metal roofing using plastic caps or factory-applied coating.
 - 2. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 4. Fasteners for Zinc-Tin Alloy-Coated Stainless-Steel Sheet: Series 300 stainless steel.
- E. Solder for Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.
- F. Butyl Sealant: ASTM C 1311, solvent-release butyl rubber sealant.
- G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FABRICATION

- A. Fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to the design, dimensions, geometry, metal thickness, and other characteristics of item indicated.
- B. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that are capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with cited sheet metal standards. Allow for thermal expansion; set true to line and level. Install Work with laps, joints, and seams permanently watertight and weatherproof; conceal fasteners where possible.
- B. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- C. Seams: Fabricate nonmoving seams with flat-lock seams. For aluminum, form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
- D. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to a width of 1-1/2 inches (38 mm); however, reduce pretinning where pretinned surface would show in completed Work.

1. Do not solder aluminum sheet.
 2. Do not pre-tin zinc-tin alloy-coated stainless steel.
 3. Do not use torches for soldering.
 4. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- E. Metal Protection: Where dissimilar metals contact each other, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating.
1. Coat concealed side of aluminum with bituminous coating where it contacts wood, ferrous metal, or cementitious construction.

END OF SECTION 076200

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 Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes joint sealants for the following applications:
 - 1. Exterior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Joints in metal panel cladding.
 - b. Joints between different materials listed above.
 - c. Perimeter joints between materials listed above and frames of doors, storefronts, windows and louvers.
 - d. Other joints as indicated.
 - 2. Interior joints in the following vertical surfaces and horizontal non-traffic surfaces:
 - a. Perimeter joints between interior wall surfaces and frames of interior doors and storefronts.
 - b. Other joints as indicated.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.
- 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.
- F. Field Test Report Log: For each elastomeric sealant application.
- G. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
- H. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- B. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 5. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.6 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. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Single-Component Neutral-Curing Silicone Sealant:
 1. Products:
 - a. Dow Corning Corporation; 790.

- b. GE Silicones; SilPruf LM SCS2700.
- c. Tremco; Spectrem 1 (Basic).
- 2. Type and Grade: S (single component) and NS (nonsag).
- 3. Class: 50.
- 4. Use Related to Exposure: NT (nontraffic).
- 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
- 6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

2.4 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 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 joint-sealant manufacturer's written instructions and the following requirements:
 - 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 porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 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.
- 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 type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed elastomeric sealant joints as follows:
 - a. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab , as appropriate for type of joint-sealant application indicated.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.
4. Inspect tested joints and report on the following:
 - a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - b. Whether sealants filled joint cavities and are free of voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.
5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

- B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 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.

3.6 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.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application JS-1: Exterior joints in masonry cladding.
 - 1. Joint Sealant: Single-component neutral-curing silicone sealant ES-1.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- B. Joint-Sealant Application JS-2: Exterior butt joints between metal panels.
 - 1. Joint Sealant: Single-component neutral- and basic-curing silicone sealant ES-2.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- C. Joint-Sealant Application JS-3: Exterior vertical joints between different materials listed above.
 - 1. Joint Sealant: Single-component neutral-curing silicone sealant ES-1.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- D. Joint-Sealant Application JS-4: Exterior perimeter joints between masonry cladding and frames of doors, storefronts, and louvers.
 - 1. Joint Sealant: Single-component neutral-curing silicone sealant ES-1.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- E. Joint-Sealant Application JS-5: Interior perimeter joints of exterior openings.
 - 1. Joint Sealant: Single-component neutral-curing silicone sealant ES-1.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Shop Drawings.

PART 2 - PRODUCTS

2.1 HOLLOW METAL DOORS AND FRAMES

- A. Fire-Rated Doors and Frames: Labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Where indicated, provide doors that have a temperature rise rating of 450 deg F (250 deg C).
- B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- C. Doors: Complying with SDI A250.8 for level and model and SDI A250.4 for physical-endurance level indicated, 1-3/4 inches (44 mm) thick unless otherwise indicated.
 - 1. Interior Doors: Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless)].
 - 2. Exterior Doors: [Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless), metallic-coated steel sheet faces.
 - a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors with thermal-resistance value (R-value) as indicated, but not less than 2.1 deg F x h x sq. ft./Btu (0.370 K x sq. m/W) when tested according to ASTM C 1363.
 - 3. Hardware Reinforcement: Fabricate according to SDI A250.6 with reinforcement plates from same material as door face sheets.
- D. Frames: ANSI A250.8; conceal fastenings unless otherwise indicated.
 - 1. Steel Sheet for Interior Frames: 0.053-inch- (1.3-mm-) minimum thickness.
 - 2. Steel Sheet for Exterior Frames: 0.067-inch- (1.7-mm-) minimum thickness, metallic coated.
 - 3. Interior Frame Construction: Full profile welded.
 - 4. Exterior Frame Construction: Full profile welded.
 - 5. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
 - 6. Frame Anchors: Not less than 0.042 inch (1.0 mm) thick.

- E. Glazing Stops: Nonremovable stops on outside of exterior doors and on secure side of interior doors; screw-applied, removable, glazing stops on inside, fabricated from same material as door face sheet in which they are installed.
- F. Door Louvers: Light proof per SDI 111C.
 - 1. Fire-Rated Automatic Louvers: Actuated by fusible links and listed and labeled.
- G. Door Silencers: Three on strike jambs of single-door frames and two on heads of double-door frames.
- H. Grout Guards: Provide where mortar might obstruct hardware operation.
- I. Prepare doors and frames to receive mortised and concealed hardware according to SDI A250.6 and BHMA A156.115.
- J. Reinforce doors and frames to receive surface-applied hardware.
- K. Prime Finish: Manufacturer's standard, factory-applied coat of lead- and chromate-free primer complying with SDI A250.10 acceptance criteria.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, free of scale, pitting, or surface defects.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, G60 (Z180) or A60 (ZF180).
- D. Frame Anchors: ASTM A 879/A 879M, 4Z (12G) coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, sheet steel complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install hollow metal frames to comply with SDI A250.11.
 - 1. Fire-Rated Frames: Install according to NFPA 80.
- B. Install doors to provide clearances between doors and frames as indicated in SDI A250.11.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying rust-inhibitive primer.

END OF SECTION 081113

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings, and color Samples.

1. For entrance doors, include hardware schedule.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Design, engineer, fabricate, and install aluminum-framed storefronts to withstand structural loads indicated.
1. Limit deflection of framing members normal to wall plane to 1/175 of clear span or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
 2. Limit deflection of framing members parallel to glazing plane to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.
- B. Structural Testing: Systems tested according to ASTM E 330 at 150 percent of inward and outward wind-load design pressures do not evidence material failures, structural distress, deflection failures, or permanent deformation of main framing members exceeding 0.2 percent of clear span.
- C. Air Infiltration: Limited to 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed framing and glass area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).
- D. Water Penetration: Systems do not evidence water leakage when tested according to ASTM E 331 at minimum differential pressure of 20 percent of positive wind-load design pressure but not less than 15 lbf/sq. ft. (720 Pa).
- E. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F (2.55 W/sq. m x K) as determined according to NFRC 100.

2.2 ALUMINUM-FRAMED STOREFRONTS

- A. Kawneer Trifab 451UT with 350T Insulpour Medium Stile Door with 1" IGU Solarban 72 Low-E Acuity Glass.

- B. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated; ASTM B 209 (ASTM B 209M) sheet; ASTM B 221 (ASTM B 221M) extrusions.
- C. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: Thermally broken.
- D. Doors: 1-3/4-inch- (44.5-mm-) thick glazed doors with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods. Provide snap-on, extruded-aluminum glazing stops and preformed gaskets.
 - 1. Door Design: As indicated, Medium stile; 3-1/2-inch (88.9-mm) nominal width.
 - 2. Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.
 - 3. Interior Doors: Provide BHMA A156.16 silencers, three on strike jamb of single-door frames and two on head of double-door frames.
 - 4. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
 - 5. Hardware: As indicated, as specified in Section 087100 "Door Hardware."
- E. Glazing: Comply with Section 088000 "Glazing."
- F. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- G. Fasteners and Accessories: Compatible with adjacent materials, corrosion resistant, nonstaining, and nonbleeding. Use concealed fasteners except for application of door hardware.
- H. Fabrication: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory-assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.
 - 1. Door Framing: Reinforce to support imposed loads. Factory-assemble door and frame units and factory-install hardware to greatest extent possible. Reinforce door and frame units for hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.
- I. Aluminum Finish: High-performance organic; three-coat fluoropolymer system complying with AAMA 2605, with finish coats containing at least 70 percent polyvinylidene fluoride resin by weight.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Isolate metal surfaces in contact with incompatible materials, including wood, by painting contact surfaces with bituminous coating or primer or by applying sealant or tape recommended by manufacturer.
- B. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.
- D. Install framing components true in alignment with established lines and grades to the following tolerances:
 - 1. Variation from Plane: Limit to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
 - 2. Alignment: For surfaces abutting in line, limit offset to 1/16 inch (1.5 mm). For surfaces meeting at corners, limit offset to 1/32 inch (0.8 mm).
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).
- E. Install doors without warp or rack. Adjust doors and hardware to provide tight fit at contact points and smooth operation.

END OF SECTION 084113



SERIES 8500 AW-PG100-C CASEMENT OUTSWING WINDOW

SECTION 08 51 13 ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SCOPE OF WORKs

- A. Furnish and install aluminum windows as shown in bid drawings and as per specifications stipulated in this section.
- B. Factory-installed glass & glazing

1.2 ITEMS FURNISHED BUT NOT INSTALLED *(Enter description and quantity of items such as extra sash, screens, glass units, hardware, etc. for attic stock)*

1.3 ITEMS INSTALLED BUT NOT FURNISHED *(Enter description and quantity of items such as air conditioners, louvers, duct work to be installed in locations as directed by Architect)*

1.4 RELATED SECTIONS

- A. Section 07 90 00 - Joint Protection.
- B. Section 08 41 00 - Entrances and Storefronts.
- C. Section 08 70 00 - Hardware.

1.5 REFERENCES

- A. AAMA - American Architectural Manufacturers Association:
 - 1. AAMA/WDMA/CSA 101/I.S.2/A440-08 "North American Fenestration Standard/Specification for Windows, Doors, and Skylights"
 - 2. AAMA 502-08 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
 - 3. AAMA 611-98 - Voluntary Specification for Anodized Architectural Aluminum
 - 4. AAMA 701/702-04 - Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals.
 - 5. AAMA 800-05 - Voluntary Specifications and Test Methods for Sealants.
 - 6. AAMA 902-99 - Voluntary Specification for Sash Balances.
 - 7. AAMA 910-93 - Voluntary Life Cycle' Specifications and Test Methods for Architectural Grade Windows and Sliding Glass Doors.
 - 8. AAMA 1503-98 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections.
 - 9. AAMA 2603-02 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
 - 10. AAMA 2604-05 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
 - 11. AAMA 2605-05 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- B. ASTM – American Society for Testing and Materials:
 - 1. ASTM E 283-04 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.



SERIES 8500 AW-PG100-C CASEMENT OUTSWING WINDOW

2. ASTM E 330-02 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference.
 3. ASTM E 331-00 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
 4. ASTM E 547-00 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential..
 5. ASTM F 588-07 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact
 6. ASTM E 2190-02 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
- C. NFRC - National Fenestration Rating Council.
1. NFRC 100-2020 - Procedure for Determining Fenestration Product U Factors.
 2. NFRC 102-2020 - Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.
 3. NFRC 200-2020 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence
 4. NFRC 500-2017 - Procedure for Determining Fenestration Product Condensation Resistance Values.
- D. IGCC - Insulating Glass Certification Council.
- E. SGCC - Safety Glazing Certification Council.
1. Z97.1-04 American National Standard for Safety Glazing Materials used in Buildings - Safety Performance Specifications and Methods of Test.
 2. 16 CFR 1201 Consumer Product Safety Commission Safety Standard for Architectural Glazing Materials - codified at Title 16, Part 1201 of the Code of Federal Regulations.
- F. ANSI Z97.1 - American National Standard For Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test/Consumer Products Safety Commission CPSC 16 CFR 1201.
- G. LEED: The Leadership in Energy & Environmental Design; U.S. Green Building Council (USGBC).
- 1.6 SUBMITTALS
- A. Submit administrative requirements under provisions of Section 01 30 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- C. Shop Drawings:
1. Elevation for each style window specified indicating its size, glazing type, muntin type and design.
 2. Manufacturer's head, jamb and sill details and section views for each window type specified.
- D. Schedules:
1. Provide a window schedule indicating the type, size, color, , and operation of each unit specified. Coordinate with window mark types found in the Contract Drawings.



SERIES 8500 AW-PG100-C CASEMENT OUTSWING WINDOW

- E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- F. Verification Samples: For each finish product specified, samples may be subsequently installed on the project.
- G. Test Reports: Submit certified independent testing agency reports indicating window units meet or exceed specified performance requirements.

1.7 SYSTEM DESCRIPTION

- A. Operation: CASEMENT OUTSWING
- B. AAMA Rating: AW-PG100-C when tested according to AAMA/WDMA/CSA 101/I.S.2/A440-08 at the gateway size of 36" x 60"
- C. Construction: 2 5/8 inch frame depth. Wall thickness: 0.080" frame/sill; 0.080" sash. Factory finished extruded aluminum frame and sash members with integral structural polyurethane thermal break.
- D. Glazing: 1 inch insulating glass (Optional 1-1/4" IGU); monolithically bonded to the sash frame with double-sided structural glazing tape (SGT) on the interior, and secured with aluminum extruded snap-in glazing bead with bulb gasket.

1.8 HARDWARE:

- A. Sash Locks: Linear Handle mounted to Jamb on interior. Lifting/Pressing down the handle shall activate aluminum linear multi-point lock bar with integral locks to engage keepers attached to the sash on multiple points as required by window size.
- B. Hinges: Concealed heavy-duty stainless steel 4-bar hinges to rotate vent outward on vertical axis.
- C. Handle: Linear Handle to lock and unlock sash. Aluminum build-in profile as handle next to lock to facilitate operation. (Optional Roto Operator).

1.9 WEATHERSTRIPPING:

- A. Sash: Two rows of 1/4" diameter foam filled bulb gasket shall be used around the sash perimeter to minimize air infiltration.
- B. Securely stake and join at corners. Provide drainage to exterior as necessary.

1.10 PERFORMANCE REQUIREMENTS

- A. Air, Water and Structural Performance Requirements:

When tested in accordance with cited test procedures, windows shall meet or exceed the following performance criteria, as well as those indicated in AAMA 101 and 101/I.S.2/A440-08 for performance grade of unit specified unless otherwise noted herein.

1. Air Test Performance Requirements:



SERIES 8500 AW-PG100-C CASEMENT OUTSWING WINDOW

- a. Performance: Air infiltration maximum 0.3 cfm per square foot at 6.24 psf pressure differential when tested in accordance with ASTM E283 for sliding sealed products.
- 2. Water Test Performance Requirements:
 - a. No uncontrolled water leakage at 12 psf static pressure differential when tested in accordance with ASTM E331 and ASTM E547.
- 3. Structural Test Performance Requirements:
 - a. Uniform Load Deflection Test
 - 1) No deflection of any unsupported span L of test unit (framing rails, muntins, mullions, etc.) in excess of L/175 at both a positive and negative load of design test pressure when tested in accordance with ASTM E330.
 - 2) Structural reinforcing that is not standard on units being furnished is not allowed.
 - b. Uniform Load Structural Test:
 - 1) Unit to be tested at 1.5 x design test pressure, both positive and negative, acting normal to plane of wall in accordance with ASTM E330.
 - 2) No glass breakage; permanent damage to fasteners, hardware parts, or anchors; damage to make windows inoperable; or permanent deformation of any main frame or ventilator member in excess of 0.2% of its clear span.
- B. Forced Entry Resistance Test: ASTM F 588, Type and Grade as indicated for each Product.
- C. Thermal Performance Requirements
 - 1. Perform thermal computer simulation in accordance with the configuration specified in NFRC 100.
 - 2. Computed Thermal Transmittance (U-Value) shall not exceed (value determined based on glazing element) BTU/hr/sq.ft./°F for the whole window assembly.
 - 3. Computed Solar Heat Gain Coefficient (SHGC) shall not exceed (value determined based on glazing element) for the whole window assembly.

1.11 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All windows specified in this section shall be supplied by a manufacturer which has been fabricating/manufacturing commercial grade aluminum windows of similar quality and performance for a minimum of ten (10) years.
- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing windows of the same type and scope as specified, preferably AAMA certified installers.
- C. Provide test reports from AAMA accredited laboratory certifying that window units are found to be in compliance with AAMA/WDMA/CSA 101/I.S.2/A440-08 and performance standards listed above.
 - 1. Test reports shall be accompanied by the window manufacturer's letter of certification stating that the tested window meets or exceeds criteria for the appropriate AAMA/WDMA/CSA 101/I.S.2/A440 test.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation in accordance with manufacturer's recommendations.
- B. Protect units against damage from the elements, construction activities and other hazards



SERIES 8500 AW-PG100-C CASEMENT OUTSWING WINDOW

before, during, and after installation.

1.13 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.

1.14 WARRANTY

- A. *Refer to Crystal Window & Door Systems, Ltd. standard warranty.*
- B. *Optional Extended Warranty (contact your Crystal sales representative).*

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: **Crystal Window & Door Systems, Ltd.**, which is located at: 31-10 Whitestone Expressway, Flushing, NY 11354; Tel: 718. 961.7300; Tel: 800. 472.9988; Fax: 718.460.4594; Web: www.crystalwindows.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 Aluminum:

- A. Extruded aluminum prime billet 6063-T5 or 6063-T6 alloy for primary components; 6063-T5, 6063-T6, or 6061-T6 for structural components; all meeting the requirements of ASTM B221.
- B. Aluminum sheet alloy 5005 H 32 (for anodic finish), meeting the requirements of ASTM B209 or alloy 3003 H 14 (for painted or unfinished sheet).

2.3 Thermal Barrier:

- A. Structural Thermal Barrier:
 - 1. Structural thermal barrier shall consist of poured-in-place polyurethane polymer that shall transfer shear during bending and provide composite action between frame components.
- B. Non Structural Thermal Barriers:
 - 1. Non structural thermal barriers are used only in conjunction with structural thermal barriers. The purpose of non structural thermal barriers is to enhance thermal performance of the primary structural thermal barriers by inhibiting heat transfer through thermal radiation and convection. Non structural thermal barriers shall not be used as primary load carrying members.
 - 2. Rigid non structural thermal barriers shall be constructed of extruded polyvinylchloride (PVC).

2.4 GLASS

- A. Glazing Materials:
 - 1. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical. Design glass



SERIES 8500 AW-PG100-C CASEMENT OUTSWING WINDOW

- to resist design wind pressure based on glass type factors for short-duration load.
2. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
 3. Strength: Where float glass is indicated, provide annealed float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
 4. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated.
 - a. U-Factors: Total-glazing values, according to NFRC 100 and based on LBL's WINDOW 7.4 computer program, expressed as BTU/sq.ft x h x deg F (W/sq. m x K).
 - b. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 7.4 computer program.
 - c. Visible Reflectance: Center-of-glazing values, according to NFRC 300.
 5. Float Glass: ASTM C 1036, Type 1, Quality-Q3, Class 1 (clear) unless otherwise indicated.
 6. Coated Glass: ASTM C 1376, Type 1, Quality-Q3, Class 1 (clear) unless otherwise indicated, of kind and condition indicated.
 7. Laminated Glass: ASTM C 1172, Type 1, Quality-Q3, Class 1 (clear) unless otherwise indicated, of kind and condition indicated.
- B. Insulating Glass Units:
1. Factory-assemble units consisting of sealed lites of glass separated by a PPG Intercept Spacer system consisting of a one-piece, metallic, U-channel design that creates an effective thermal barrier to help reduce conducted heat loss through the window.
 2. Insulating glass units shall be sealed with an integral dessicant matrix and a butyl sealant extruded around the entire perimeter of the spacer to achieve a seal. The sealant applied is to be Dual Seal Equivalent (DSE). Interspace to be filled with air or argon gas as required by thermal computer simulation.
 3. Insulating Glass Types: Low-E coated, insulating glass units.
 - a. Overall Unit Thickness: 1", 1-1/4"
 - b. Thickness of Each Glass Lite: 3/32", 1/8", 3/16" or 1/4"
 - c. Outdoor Lite: Class 1 (Clear) float glass, fully tempered float glass, or laminated glass
 - d. Interspace Content: Air or Argon Gas.
 - e. Indoor Lite: Class 1 (Clear) float glass, fully tempered float glass, or laminated glass
 - f. Low-E Coating: Sputtered on second or third surface, pyrolitic on fourth surface
 - g. Glass Winter Night time U-Value: 0.27 maximum.
 - h. Solar Heat Gain Coefficient: 0.46 maximum.
 - i. Provide safety glazing labeling, if necessary.

2.5 WINDOW ACCESSORIES

Provide the following accessories as specified in the contract drawings. Finish to match window frames or as selected by the Architect:

- A. Wrap Around Panning
- B. Preset Panning
- C. Snap Trim/Clips



SERIES 8500 AW-PG100-C CASEMENT OUTSWING WINDOW

- D. Expanders
- E. Receptors
- F. Subsills and Subsill Anchors
- G. Mullions and Mullion Covers
- H. Exterior Sills
- I. Interior Stools
- J. Muntins

2.6 FINISHES

- A. Conforming to AAMA 2604-05 specification, finish on all extruded aluminum shall consist of zero or near-zero VOC, organic POWDER COAT with a baked on super-durable thermosetting polyester resin, electro-statically applied on five-stage pre-treated aluminum surface. Powder coat material to be as manufactured by Sherwin Williams or PPG Powder Coatings.
- B. Color to be selected from Manufacturer's Standard Color Chart (or custom-matched as required by project Architect/Owner).

2.7 Insect Screens:

- A. Screen frames shall consist of tubular extruded aluminum profiles with finish to match window frames.
- B. Fiberglass mesh (18 X 16) with PVC spline.

2.8 Steel components including attachment fasteners shall be 300 series stainless steel except as noted.

2.9 Thermoplastic or thermo-set plastic caps, housings and other components shall be injection-molded nylon, extruded PVC, or other suitable compound.

2.10 Sealants:

- 1. Sealants shall comply with applicable provisions of AAMA 800 and/or Federal Specifications FS-TT-001 and 002 Series.
- 2. Frame joinery sealants shall be suitable for application specified and as tested and approved by window manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.



SERIES 8500 AW-PG100-C CASEMENT OUTSWING WINDOW

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.4 ANCHORAGE

- A. Anchor window units and/or assemblies sufficiently to maintain permanent positions when subjected to normal thermal movement, specified building movement and specified wind loads.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Final operating adjustment shall be made after glazing work is complete. Operating sash and ventilator shall operate smoothly and shall be weathertight when in locked position
- C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 DISPOSAL OF DEBRIS

- A. Remove all garbage off site and legally dispose of existing windows and debris generated from the installation of the new windows.

3.7 OPTIONAL FIELD TESTING

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspection
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
 - 1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AMA 502.
 - 2. Air-Infiltration Testing:
 - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/1.S.2/A440 performance class indicated.
 - b. Allowable Air-Leakage Rate: 1.5 times the applicable AMA/WDMA/CSA 101/1.S.2/A440 rate for product type and performance class rounded down to one decimal place.
 - 3. Water-Resistance Testing:
 - a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/1.S.2/A440 performance grade indicated.
 - b. Allowable Water Infiltration: No water penetration.



SERIES 8500 AW-PG100-C CASEMENT OUTSWING WINDOW

4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
5. Test Reports: Prepared according to AAMA 502.
- C. Windows will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.8 ADJUSTMENT AND CLEAN UP

- A. Adjust all products, sash, vents, and hardware after installation, as necessary to provide proper operation and a weather tight installation
- B. Remove any labels and dirt from the window.

END OF SECTION

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 doors, glazed storefronts, windows.
 - 2. Glazing sealants and accessories.

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 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 the following products; 12 inches (300 mm) square.
 - 1. Insulating glass.

- D. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch (300-mm) lengths.
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- F. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For insulating glass and glazing sealants, for tests performed by a qualified testing agency.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- C. Preconstruction adhesion and compatibility test report.
- D. Sample Warranties: For special warranties.

1.7 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.
- B. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

1.9 WARRANTY

- A. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of

insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.
- C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
 1. Design Wind Pressures: 60 PSF.
- D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 1. For laminated-glass lites, properties are based on products of construction indicated.
 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
 4. 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.
 5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: "Glazing Manual."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IgCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: 6 mm.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172. 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 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.

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 E 2190.
1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
 2. Spacer: Aluminum with powdered metal paint finish in color selected by Architect, to match doors and framing members.
 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

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. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 - c. Sika Corporation.

2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; 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. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 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 and referenced glazing publications, to comply with system performance requirements.
 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and

glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- 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.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 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. Do not remove release paper from tape until right before each glazing unit is installed.
- 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.

3.5 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.

3.6 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.

3.7 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.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 INSULATING GLASS SCHEDULE

- A. Glass Type: Clear insulating glass.
 - 1. Overall Unit Thickness: 1 inch (25 mm).
 - 2. Minimum Thickness of Each Glass Lite: 6 mm.
 - 3. Outdoor Lite: Fully tempered float glass.
 - 4. Interspace Content: Argon.
 - 5. Indoor Lite: Fully tempered float glass.
 - 6. Safety glazing required.

END OF SECTION 088000

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assemblies per ASTM E 90 and classified per ASTM E 413 by a qualified independent testing and inspecting agency.

2.2 PANEL PRODUCTS

- A. Provide in maximum lengths available to minimize end-to-end butt joints.
- B. Interior Gypsum Board: ASTM C 1396/C 1396M, in thickness indicated, with manufacturer's standard edges. Regular type unless otherwise indicated. Type as required for specific fire-resistance-rated assemblies. Sag-resistant type for ceiling 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. Georgia-Pacific Gypsum LLC.
 - b. National Gypsum Company.
 - c. USG Corporation.
- C. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, in thickness indicated. Type X where required for fire-resistance-rated assemblies and where indicated.
 - a. Georgia-Pacific Gypsum LLC.
 - b. National Gypsum Company.
 - c. USG Corporation.
- D. Cementitious Backer Units: ANSI A118.9, ASTM C 1288, or ASTM C 1325.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. CertainTeed Corporation.
- b. National Gypsum Company.
- c. USG Corporation.

2.3 ACCESSORIES

- A. Trim Accessories: ASTM C 1047, formed from galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet. For exterior trim, use accessories formed from hot-dip galvanized-steel sheet, plastic, or rolled zinc.
 1. Provide cornerbead at outside corners unless otherwise indicated.
 2. Provide LC-bead (J-bead) at exposed panel edges.
 3. Provide control joints where indicated.
- B. Aluminum Accessories: Extruded-aluminum accessories indicated with manufacturer's standard corrosion-resistant primer.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corporation.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
- C. Joint-Treatment Materials: ASTM C 475/C 475M.
 1. Joint Tape: Paper unless otherwise recommended by panel manufacturer.
 2. Joint Compounds: Setting-type taping compound and drying-type, ready-mixed, compounds for topping.
 3. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
 4. Cementitious Backer Unit Joint-Treatment Materials: Products recommended by cementitious backer unit manufacturer.
- D. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 1. Low-Emitting Materials: Comply with Section 018113.16 - Sustainable Design Requirements - LEED 2009 for Commercial Interiors.
- E. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant complying with ASTM C 834.
 1. Low-Emitting Materials: Comply with Section 018113.16 - Sustainable Design Requirements - LEED 2009 for Commercial Interiors.
- F. Sound-Attenuation Blankets: ASTM C 665, Type I (unfaced).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install gypsum board to comply with ASTM C 840.
 - 1. Isolate gypsum board assemblies from abutting structural and masonry work. Provide edge trim and acoustical sealant.
 - 2. Single-Layer Fastening Methods: Fasten gypsum panels to supports with screws.
 - 3. Multilayer Fastening Methods: Fasten base layers with screws, and face layers to base layers with adhesive and supplementary fasteners.
- B. Install cementitious backer units to comply with ANSI A108.11.
- C. Fire-Resistance-Rated Assemblies: Comply with requirements of listed assemblies.
- D. Finishing Gypsum Board: ASTM C 840.
 - 1. At concealed areas, unless a higher level of finish is required for fire-resistance-rated assemblies, provide Level 1 finish: Embed tape at joints.
 - 2. At substrates for tile, provide Level 2 finish: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges.
 - 3. At all exposed surfaces, provide Level 5 finish: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges. Apply skim coat to entire surface.
- E. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.
- F. Cementitious Backer Units: Finish according to manufacturer's written instructions.

END OF SECTION 092900

PART 1 – GENERAL

1.1 SUMMARY

- A. Scope of work - Provide porcelain tile, tile installation materials and accessories as indicated on drawings, as specified herein, and as needed for complete and proper installation.
- B. Related Documents - provisions within General and Supplementary General Conditions of the Contract, Division 1 - General Requirements, and the Drawings apply to this Section.

1.2 SECTION INCLUDES

- A. Thin porcelain tile
- B. Installation Products; adhesives, mortars, grouts and sealants
- C. Waterproofing membranes for porcelain tile work
- D. Anti-fracture membranes for porcelain tile work
- E. Floor drains, with integrated bonding flange
- F. Linear floor drains
- G. Thresholds, trim, cementitious backer units and other accessories specified herein.

1.3 RELATED SECTIONS

- A. Section 079200 Joint Sealants
- B. Section 092900 Gypsum Board
- C. Section 093000 Tiling
- D. Section 224000 Plumbing fixtures: floor drains

1.4 REFERENCE STANDARDS

- A. American National Standards Institute (ANSI) A137.1 American National Standard Specifications For Ceramic Tile
- B. American National Standards Institute (ANSI) A108.01 - A108.17 American National Standard Specifications For The Installation Of Ceramic Tile
- C. American National Standards Institute (ANSI) A118.1 - A118.15 American National Standard Specifications For The Installation Of Ceramic Tile
- D. American Society For Testing And Materials (ASTM) C531 Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes
- E. American Society For Testing And Materials (ASTM) C627 Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester
- F. American Society For Testing And Materials (ASTM) C794 Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
- G. American Society For Testing And Materials (ASTM) C920 Standard Specification for Elastomeric Joint Sealants
- H. American Society For Testing And Materials (ASTM) D1248 Standard Test Method for Staining of Porous Substances by Joint Sealants
- I. American Society For Testing And Materials (ASTM) E989 Standard Classification for Determination of Impact Insulation Class (IIC)
- J. American Society For Testing And Materials (ASTM) E1155 Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness
- K. American Society For Testing and Materials (ASTM) 2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using in situ Probes

- L. American Society of Mechanical Engineers (ASME) - ASME A112.6.3 Floor and Trench Drains
- M. Metal Lath/Steel Framing Association (ML/SFA) 540 Lightweight Steel Framing Systems Manual
- N. Steel Stud Manufacturers Association (SSMA) Product Technical Information and ICBO Evaluation Service, Inc. Report ER-4943P
- O. Tile Council Of North America (TCNA) Handbook For Ceramic, Glass, and Stone Tile Installation

1.5 SYSTEM DESCRIPTION

- A. Interior installations of thin porcelain tiles over concrete floor slabs using latex Portland cement mortar and latex Portland cement grout.
- B. Interior installations of thin porcelain tiles over cementitious backer board walls using latex Portland cement mortar and epoxy grout.

1.6 SUBMITTALS

- A. Submit shop drawings and manufacturers' product data.
- B. Submit samples of each type/style/finish/size/color of thin porcelain tiles.
- C. Submit manufacturers' installation instructions.
- D. Submit proof of warranty.
- E. Submit sample of installation system demonstrating compatibility/functional relationships between adhesives, mortars, grouts and other components. Submit proof from tile or Ceramic tile manufacturer or supplier verifying suitability of thin porcelain tiles for specific application and use; including dimensional stability, water absorption, freeze/thaw resistance (if applicable), resistance to thermal cycling, and other characteristics that the project may require. These characteristics must be reviewed and approved by the project design professional(s).
- F. Submit list from manufacturer of installation system/adhesive/mortar/grout identifying a minimum of three (3) similar projects, each with a minimum of ten (10) years service.
- G. For alternate materials, at least thirty (30) days before bid date submit independent laboratory test results confirming compliance with specifications listed in Part 2 - Products.

1.7 QUALITY ASSURANCE

- A. Tile Manufacturer (single source responsibility): Company specializing in large, thin porcelain tiles with three (3) years minimum experience. Obtain tile from a single source with resources to provide products of consistent quality in appearance and physical properties.
- B. Installation System Manufacturer (single source responsibility): Company specializing in adhesives, mortars, grouts and other installation materials with ten (10) years minimum experience and ISO 9001 certification. Obtain installation materials from single source manufacturer to insure consistent quality and full compatibility.
- C. Submit laboratory confirmation of adhesives, mortars, grouts and other installation materials:
 - 1. Identify proper usage of specified materials using positive analytical method.
 - 2. Identify compatibility of specified materials using positive analytical method.
 - 3. Identify proper color matching of specified materials using a positive analytical method.
- D. Installer qualifications: company specializing in installation of large, thin porcelain tiles with five (5) years documented experience with installations of similar scope, materials and design.

1.8 MOCK-UPS

- A. Provide mock-up of each type/style/finish/size/color of thin porcelain tiles, along with respective installation adhesives, mortars, grouts and other installation materials.

1.9 PRE-INSTALLATION CONFERENCE

Pre-installation conference: At least three weeks prior to commencing the work attend a meeting at the jobsite to discuss conformance with requirements of specification and job site conditions. Representatives of owner, architect, general contractor, tile subcontractor, Tile Manufacturer, Installation System Manufacturer and any other parties who are involved in the scope of this installation must attend the meeting.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Site: deliver and store packaged materials in original containers with seals unbroken and labels, including grade seal, intact until time of use, in accordance with manufacturer's instructions.
- B. Store large, thin porcelain tiles and installation system materials in a dry location; handle in a manner to prevent chipping, breakage, and contamination.
- C. Thin porcelain tiles are to be stored both upright and horizontal. If tiles are placed on top of each other, ensure that each tile is clean and that the surface that the slabs are resting on is flat. If tiles are stored in their vertical position, rest them on their long side. This side must be protected by wood, cardboard, polystyrene or rubber cement.
- D. To correctly lift and handle pallets / crates of large porcelain slabs using a forklift, position the forks at a distance of minimum 3.3 feet (1 meter) from each other, perpendicular to the long side of the pallet and at the center of the pallet. If necessary to move pallets of large porcelain slabs, by the pallet short side, forks must be at least as long as the longest panel edge.
- E. Protect latex additives, organic adhesives, epoxy adhesives and sealants from freezing or overheating in accordance with manufacturer's instructions; store at room temperature when possible.
- F. Store Portland cement mortars and grouts in a dry location.

1.11 PROJECT/SITE CONDITIONS

- A. Provide ventilation and protection of environment as recommended by manufacturer.
- B. Prevent carbon dioxide damage to thin porcelain tiles, as well as adhesives, mortars, grouts and other installation materials, by venting temporary heaters to the exterior.
- C. Maintain ambient temperatures not less than 50°F (10°C) or more than 100°F (38°C) during installation and for a minimum of seven (7) days after completion. Setting of portland cement is retarded by low temperatures. Protect work for extended period of time and from damage by other trades. Installation with latex Portland cement mortars requires substrate, ambient and material temperatures at least 37°F (3°C). There is to be no ice in slab. Freezing after installation will not damage latex Portland cement mortars. Protect Portland cement based mortars and grouts from direct sunlight, radiant heat, forced ventilation (heat & cold) and drafts until cured to prevent premature evaporation of moisture. Epoxy mortars and grouts require surface temperatures between 60°F (16°C) and 90°F (32°C) at time of installation. It is the General Contractor's responsibility to maintain temperature control.

1.12 SEQUENCING AND SCHEDULING

- A. Coordinate installation of tile work with related work.
- B. Proceed with tile work only after curbs, vents, drains, piping, and other projections through substrate have been installed and when substrate construction and framing of openings have been completed.

1.13 WARRANTY

- A. The Contractor warrants the work of this Section to be in accordance with the Contract Documents and free from faults and defects in materials and workmanship for a period of 25 years. The manufacturer of adhesives, mortars, grouts and other installation materials shall provide a written twenty five (25) year warranty, which covers materials and labor - reference LATICRETE Warranty Data Sheet 025.0 for complete details and requirements.

1.14 MAINTENANCE

Submit maintenance data. Include cleaning methods, cleaning solutions recommended, stain removal methods, as well as polishes and waxes recommended.

1.15 EXTRA MATERIALS STOCK

Upon completion of the work of this Section, deliver to the Owner 2% minimum additional tile and trim shape of each type, color, pattern and size used in the Work, as well as extra stock of adhesives, mortars, grouts and other installation materials for the Owner's use in replacement and maintenance. Extra stock is to be from same production run or batch as original tile and installation materials.

PART 2 - PRODUCTS

2.1 TILE MANUFACTURERS

Subject to compliance with paragraphs 1.12 and performance requirements, provide products by the manufacturers indicated on the Drawings.

2.2 PORCELAIN TILE INSTALLATION MATERIALS MANUFACTURER

- A. LATICRETE International, Inc., 1 Laticrete Park North, Bethany, CT 06524-3423 USA Phone 800-243-4788, (203) 393-0010 technicalservices@laticrete.com, www.laticrete.com; www.laticrete.com/green

2.5 INSTALLATION ACCESSORIES – LARGE THIN PORCELAIN TILE

- A. Waterproofing and Crack Isolation Membrane to be thin, cold applied, single component liquid and load bearing and UL GREENGUARD Gold compliant. Reinforcing fabric to be non-woven rot-proof specifically intended for waterproofing membrane. Waterproofing Membrane to be non-toxic, non-flammable, and non-hazardous during storage, mixing, application and when cured. It shall be certified by IAPMO and ICC approved as a shower pan liner and shall also meet the following physical requirements:
- | | |
|--|--------------------------|
| 1. Hydrostatic Test (ASTM D4068): | Pass |
| 2. Elongation @ break (ASTM D751): | 20-30% |
| 3. System Crack Resistance (ANSI A118.12): | Pass (High) |
| 4. 7 day Tensile Strength (ANSI A118.10): | 265 psi (1.8 MPa) |
| 5. 7 day Shear Bond Strength (ANSI A118.10) | 200 psi (1.4 MPa) |
| 6. 28 Day Shear Bond Strength (ANSI A118.4): | 214 psi (1.48 – 2.4 MPa) |
| 7. Service Rating (TCNA/ASTM C627): | Extra Heavy |
| 8. Total VOC Content: | ≤0.22 mg/m3 |

(Basis of Design: LATICRETE® HYDRO BAN®)**

- B. Epoxy Waterproofing Membrane to be 3 component epoxy, trowel applied specifically designed to be used under Ceramic tile, stone or brick and requires only 24 hours prior to flood testing:
1. Breaking Strength (ANSI A118.10): 450-530 psi (3.1-3.6 MPa)
 2. Waterproofness (ANSI A118.10): No Water penetration
 3. 7 day Shear Bond Strength (ANSI A118.10): 110-150 psi (0.8-1 MPa)
 4. 28 Day Shear Bond Strength (ANSI A118.10): 90-120 psi (0.6–0.83 MPa)
 5. 12 Week Shear Bond Strength (ANSI A118.10): 110-130 psi (0.8-0.9 MPa)
 6. Total VOC Content: <3.4 g/L

(Basis of Design: LATAPOXY® Waterproof Flashing Mortar)

- C. Waterproofing Sheet Membrane to be thin, durable polyethylene core with a fused non-woven polypropylene exterior surface, IAPMO approved as shower pan liner, and allow for use of either polymer modified or un-modified tile mortars, depending upon substrate and type of tile used.
1. Waterproofness (ASTM D4068): Pass
 2. 7 day Shear Bond Strength (ANSI A118.10): ≥ 170 psi
 3. 7-Day Water Immersion Shear Strength (ASTM C482-09): ≥ 100 psi
 4. Service Rating (TCNA ASTM C627): Extra Heavy

(Basis of Design: LATICRETE HYDRO BAN Sheet Membrane)

- D. Lightweight, Waterproof Tile Backer Board to comprised of high-density polystyrene core and reinforced, waterproof cementitious coating on both sides. Available in thicknesses from ¼ inch to 2 inches (6 millimeters to 50 millimeters) and specifically designed for use in bonded tile and stone installations.
1. Compressive Strength (ASTM D1621): 30 psi (0.2 MPa)
 2. Compressive Modulus (ASTM D1621): ≥ 1200 psi (8.3 MPa)
 3. Tensile Strength (ASTM C297): 50 psi (0.3 MPa)
 4. Elongation (ASTM C297): 3.1%
 5. Shear Strength (ASTM C273): 30 foot pounds (0.04 kN-meter)
 6. Waterproofness (ANSI A118.10): Pass
 7. R-Value (ASTM C578): R=4.8/inch
 8. Flexural Strength (ASTM C947): ≥ 1900 psi (13.1 MPa)
 9. Temperature Limits: 160 – 220 degrees F
 10. Flash Point: ≥ 600 degrees F

(Basis of Design: LATICRETE® HYDRO BAN Board)

- E. Low Profile Linear Floor Drain to be comprised of heavy duty 304 stainless steel, specially designed for bonded waterproofing installations, allow for large format tile use in showers with single slope to drain, available with standard, vertical waste line and horizontal side outlet, and with flow rate of $\geq$ eight (8) gallons per minute (30 liters per minute).

(Basis of Design: LATICRETE HYDRO BAN Linear Drain)

- F. Low Profile Bonding Flange Floor Drain to be comprised of heavy duty 304 stainless steel, specially designed for bonded waterproofing installations, allow for elimination of pre-slope layer and primary shower pan liner, per TCNA B422, and with flow rate of $\geq$ eight (8) gallons per minute (30 liters per minute).

(Basis of Design: LATICRETE HYDRO BAN Bonding Flange Drain)

- G. Wire Reinforcing: 2 inch x 2 inch (50 x 50 mm) x 16 ASW gauge or 0.0625 inch (1.6mm) diameter galvanized steel welded wire mesh complying with ANSI A108.02 3.7, ASTM A185 and ASTM A82.
- H. Galvanized, diamond metal lath: flat expanded type, weighing not less than 3.2 lb. per yd² (1.4 kg/m²). Metal lath shall comply with ASTM C847.
- I. Cleavage membrane: 15 pound asphalt saturated, non-perforated roofing felt complying with ASTM D226, 15 pound coal tar saturated, non-perforated roofing felt complying with ASTM D227 or 4.0 mils (0.1 mm) thick polyethylene plastic film complying with ASTM D4397.
- J. Cementitious backer board units: size and thickness as specified, complying with ANSI A118.9.
- K. Thresholds: Provide marble saddles complying with ASTM C241 for abrasion resistance and ASTM C503 for exterior use, in color, size, shape and thickness as indicated on drawings.

2.6 INSTALLATION MATERIALS – LARGE THIN PORCELAIN TILE

- A. Moisture Vapor Reduction to be epoxy based and UL GREENGUARD Gold compliant as well as meet the following physical requirements:
 - 1. Shear Bond to Concrete (ANSI A118.12-5.1.5): >285 psi (2.0 MPa)
 - 2. Alkalinity Resistance (ASTM C267): Pass
 - 3. Permeability (ASTM F1869): 9.7 lbs/1,000ft²/24 hours down to 0.2 lbs/1,000 ft²/24hours (248 µg/s•m² down to 11 µg/s•m²)
 - 4. Total VOC Content: ≤0.22 mg/m³

(Basis of Design: LATICRETE® NXT™ Vapor Reduction Coating)**

- B. Latex Portland Cement Mortar for thick beds, screeds, leveling beds and scratch/plaster coats to be weather, frost, shock resistant, UL GREENGUARD Gold compliant, and meet the following physical requirements:
 - 1. Compressive Strength (ANSI A118.4 Modified): >4,000 psi (27.6 MPa)
 - 2. Water Absorption (ANSI A118.6): ≤ 5%
 - 3. Service Rating (TCA/ASTM C627): Extra Heavy
 - 4. Smoke & Flame Contribution (ASTM E84 Modified): 0
 - 5. Total VOC Content: ≤0.22 mg/m³

(Basis of Design: LATICRETE 3701 Fortified Mortar)**

- C. Self-Leveling Underlayment shall be mixed with water to produce a pumpable, fast setting, free flowing cementitious underlayment which can be poured from 1/8 in. to 1-1/4 in. (3 to 32mm) thick in one pour and GREENGUARD Gold compliant.
 - 1. 28 Day Compressive Strength (ASTM C1708.): >4000 psi (27.6 MPa)
 - 2. Tensile Bond Strength (ASTM C1583): >500 psi (3.5 MPa)
 - 3. Time To Foot Traffic: 1 – 4 Hours
 - 4. Total VOC Content: < 0.05 mg/m³

(Basis of Design: LATICRETE NXT Level Plus and NXT Primer)

- D. Epoxy Adhesive to be chemical resistant 100% solids epoxy with high temperature resistance, GREENGUARD Gold compliant, conform to ISO R2, and meet the following minimum physical requirements:

- | | |
|--|-------------------------|
| 1. Compressive strength (ANSI A118.3): | >5000 psi (34.4 MPa) |
| 2. Shear Bond Strength (ANSI A118.3): | >1250 psi (8.6 MPa) |
| 3. Thermal Shock Resistance (ANSI A118.3): | >600 psi (4.1 MPa) |
| 4. Tensile Strength (ANSI A118.3): | >1400 psi (9.6 MPa) |
| 5. Shrinkage (ANSI A118.3): | 0 – 0.1% |
| 6. Total VOC Content: | ≤0.22 mg/m ³ |
| 7. ISO 13007 Classification: | R2 |
8. Cured Epoxy Adhesive to be chemically and stain resistant to ketchup, mustard, tea, coffee, milk, soda, beer, wine, bleach (5% solution), ammonia, juices, vegetable oil, detergents, brine, sugar, cosmetics and blood, as well as chemically resistant to dilute food acids, dilute alkalis, gasoline, turpentine and mineral spirits.

(Basis of Design: LATAPOXY 300 Adhesive)**

- E. Improved Modified Dry-Set Cement Thin Bed Mortar for thin set and slurry bond coats to be weather, frost, shock resistant, non-flammable, GREENGUARD Gold compliant, conform to ISO C2TES2, and meet the following physical requirements:

- | | |
|---|-------------------------|
| 1. 28 Day Porcelain Tile Shear Strength (ANSI A118.15): | >450 psi (3.1 MPa) |
| 2. 28 Day Dry Cure / 20 Cycle Freeze-Thaw Porcelain Tile Shear Strength (ANSI A118.15): | ≥ 250 psi (1.7 MPa) |
| 3. 7 Day Cure / 7 Day Water Immersion (ANSI A118.15): | >280 psi (1.9 MPa) |
| 4. Extended Open Time (ANSI A118.15): | > 100 psi (0.7 MPa) |
| 5. Smoke & Flame Contribution (ASTM E84 Modified): | 0 |
| 6. Total VOC Content: | ≤0.22 mg/m ³ |

(Basis of Design: LATICRETE® 254 Platinum)**

- F. Rapid-Setting Modified Dry-Set Cement Thin Bed Mortar to be weather, frost, shock resistant, non-flammable, conform to EN12004:2007 + A1:2012 for Class C2FTS2 adhesive, and meet the following physical requirements:

- | | |
|--|--------------------|
| 1. 28 Day Porcelain Tile Shear Strength (ANSI A118.4): | >400 psi (2.8MPa) |
| 2. 7 Day Cure / 7 Day Water Immersion (ANSI A118.4): | >200 psi (1.4 MPa) |
| 3. Shear Bond / Quarry Tile to Plywood (ANSI A118.11): | >190 psi (1.3 MPa) |
| 4. Open Time (ANSI A118.4): | ≥ 30 minutes |

(Basis of Design: LATICRETE 254R Platinum Rapid)

- G. Epoxy Grout (Commercial/Residential) shall be non-toxic, non-flammable, non-hazardous during storage, mixing, application and when cured, UL GREENGUARD Gold compliant, and shall meet the following physical requirements:

- | | |
|--|----------------------|
| 1. Compressive Strength (ANSI A118.3): | 3,800 psi (26.2 MPa) |
| 2. Shear Bond Strength (ANSI A118.3): | 1,100 psi (7.6 MPa) |
| 3. Tensile Strength (ANSI A118.3): | 1,100 psi (7.6 MPa) |
| 4. Thermal Shock (ANSI A118.3): | >800 psi (5.5 MPa) |
| 5. Water Absorption (ANSI A118.3): | <0.05% |
| 6. Vertical Joint Sag (ANSI A118.3): | Pass |

7. Total VOC Content: $\leq 0.22 \text{ mg/m}^3$
8. Cured Epoxy Grout to be chemically and stain resistant to ketchup, mustard, tea, coffee, milk, soda, beer, wine, bleach (5% solution), ammonia, juices, vegetable oil, brine, sugar, cosmetics, and blood, as well as chemically resistant to dilute acids and dilute alkalis.

(Basis of Design: LATICRETE SPECTRALOCK® PRO Premium Grout)**

- H. Latex Portland Cement Grout to be weather, frost and shock resistant, conform to ISO 13007 requirements for CG2WAF, UL GREENGUARD Gold compliant, as well as meet the following physical requirements:
1. Compressive Strength (ANSI A118.7): 3,500 psi (24.1 MPa)
 2. Tensile Strength (ANSI A118.7): 510 psi (3.5 MPa)
 3. Flexural Strength (ANSI A118.7): 1,250 psi (8.6 MPa)
 4. Water Absorption (ANSI A118.7): $< 5\%$
 5. Linear Shrinkage (ANSI A118.7): $< 0.5 \%$
 6. Smoke & Flame Contribution (ASTM E84 Modified): 0
 7. Total VOC Content: $\leq 0.22 \text{ mg/m}^3$

(Basis of Design: LATICRETE PERMACOLOR® Select)**

- I. Expansion and Control Joint Sealant to be a one component, neutral cure, exterior grade silicone sealant and meet the following requirements:
1. Tensile Strength (ASTM C794): 280 psi (1.9 MPa)
 2. Hardness (ASTM D751; Shore A): 25 (colored sealant) / 15 (clear sealant)
 3. Weather Resistance (QUV Weather-ometer): 10,000 hours (no change)

(Basis of Design: LATICRETE LATASIL™ and LATASIL 9118 Primer)

** UL GREENGUARD Certified For Low Chemical Emissions (ULCOM/GG 2818) and UL GREENGUARD Gold Certified For Low Chemical Emissions (ULCOM/GG UL 2818)

PART 3 – EXECUTION

1.1 SUBSTRATE EXAMINATION

- A. Verify that surfaces to be covered with large, thin porcelain tile installations:
1. Sound, rigid and conform to good design/engineering practices;
 2. Systems, including the framing system and panels, over which thin porcelain tiles will be installed shall be in conformance with the International Residential Code (IRC) for residential applications, the International Building Code (IBC) for commercial applications, or applicable building codes.
 3. Clean and free of dust, dirt, oil, grease, sealers, curing compounds, laitance, efflorescence, form oil, loose plaster, paint, and scale;
 4. For thin-bed porcelain tile installations when a cementitious bonding material will be used: maximum allowable variation in the tile substrate is 1/8" in 10' (3mm in 3m) from the required plane, with no more than 1/16" variation in 24" (1.5mm variation in 600mm) when measured from the high points in the surface. For modular substrate units, such as adjacent concrete masonry units, adjacent edges cannot exceed 1/32" (0.8mm) difference in height.
 5. To fully evacuate water, shower pan membranes and bonded waterproofing membranes in wet areas must slope to and connect with a drain. Plumbing code typically requires

- membranes to be sloped a minimum of ¼" per ft. (6mm per 300mm) and extend at least 3" (75mm) above the height of the curb or threshold. Account for the perimeter floor height required to form adequate slopes. Membranes must be installed over the other horizontal surfaces in wet areas subject to deterioration, like shower seats. They must be sloped and configured so as to direct water to the membrane connected to the drain. The weep holes of clamping ring drains enable water to pass from the membrane into the plumbing system. Crushed Ceramic tile or stone, or other positive weep protectors, placed around/over weep holes help prevent their blockage. To form a watertight seal, membranes must have adequate contact with the clamping ring of the drain or with the bonding area of an integrated bonding flange. Dry as per American Society for Testing and Materials (ASTM) D4263 "**Standard Test for Determining Moisture in Concrete by the Plastic Sheet Method.**"
6. Not leveled with gypsum or asphalt based compounds
 7. For substrates scheduled to receive a waterproofing and/or crack isolation membrane, maximum amount of moisture in the concrete/mortar bed substrate should not exceed 5 lbs./1,000 ft² / 24 hours (283 µg/s•m²) per ASTM F1869 or 75% relative humidity as measured with moisture probes per ASTM F2170. Consult with finish materials manufacturer to determine the maximum allowable moisture content for substrates under their finished material. Please refer to LATICRETE TDS [183](#) "Drying of Concrete" and TDS [166](#) "LATICRETE and Moisture Vapor Emission Rate, Relative Humidity and Moisture Testing of Concrete", available at www.laticrete.com, for more information.
- B. Concrete surfaces shall also be:
1. Cured a minimum of 28 days at 70°F (21°C), including an initial seven (7) day period of wet curing;
 2. Wood float finished, or better, if the installation is to be done by the thin bed method;
- C. Advise General Contractor and Architect of any surface or substrate conditions requiring correction before tile work commences. ***Beginning of work constitutes acceptance of substrate or surface conditions.***

3.2 SURFACE PREPARATION – FRAMED WALLS

- A. CEMENTITIOUS BACKER UNIT (CBU) OVER STEEL FRAMING
1. All designs, specifications and construction practices shall be in accordance with industry standards. Refer to latest editions of:
American Iron and Steel Institute (AISI) "**Specification for the Design of Cold-Formed Steel Structural Members**" [www.steel.org];
Steel Stud Manufacturers Association (SSMA) "**Product Technical Information**" and "**ICBO Evaluation Service, Inc. Report ER-4943P**" [www.ssma.com];
Metal Lath/Steel Framing Association "**Steel Framing Systems Manual.**"
 2. Prior to commencing work, installer must submit to Architect/Structural Engineer for approval, shop drawings showing wall/façade construction and attachment details. All attachments must be designed to prevent transfer of building or structural movement to the wall/façade.
 3. Construct all framing with galvanized or other rust resistant steel studs and channels; minimum requirements:
Stud Gauge: 16 gauge (1.5mm);
Stud Steel: conforming to ASTM A570 – latest edition with a minimum yield point of 50 ksi;
Stud Spacing: not to exceed 16" (400mm) on center;
Stud Width: 6" (150mm);
Horizontal Bridging: Not to exceed 4' (1.2m) on center; 16 gauge CR channel typical ***or as specified by structural engineer.***

4. Studs shall be seated squarely in the channel tracks with the stud web and flange abutting the track web, plumbed or aligned, and securely attached to the flanges or web of both the upper and lower tracks by welding. Similarly connect horizontal bridging/purlins and anti-racking diagonal bracing **as determined by structural engineer**. Grind welds smooth and paint with rust inhibiting paint. Finished frame and components must be properly aligned, square and true.
5. Provide adequate support of framing elements during erection to prevent racking, twisting or bowing. Lay out the CBU installation so all board edges are supported by metal framing (studs vertically and purlins horizontally). Cut/fit CBU and add additional framing elements as required to support board edges. Stagger boards in courses to prevent continuous vertical joints and allow $\frac{1}{8}$ – $\frac{3}{16}$ " (3–5mm) between sheets.
6. Fasten the CBU with $\frac{7}{8}$ " (22mm) minimum length, non-rusting, self-imbedding screws for metal studs (BUILDEX® Catalog item 10-24 17/16 Wafer T3Z or equivalent). Fasten the boards every 6" (150mm) at the edges and every 8" (200mm) in the field. Stagger placement of screws at seams. Place screws no less than $\frac{3}{8}$ " (9mm), and no more than 1" (25mm), from board edges.
7. Tape all the board joints with the alkali resistant 2" (50mm) wide reinforcing mesh provided by the CBU manufacturer imbedded in the same mortar used to install the thin porcelain tiles.
8. Compliance with design criteria and state and local building codes must approved and certified by a qualified structural engineer. Use more stringent design criteria when necessary to comply with state and local building code stiffness requirements for thin veneers.

3.3 INSTALLATION ACCESSORIES – THIN PORCELAIN TILE

A. ***Waterproofing and Crack Isolation Membrane (Liquid-Applied):***

Install waterproofing and crack isolation membrane in compliance with current revisions of ANSI A108.1 (2.7 Waterproofing), ANSI A108.13, and ANSI A108.17. Review the installation and plan the application sequence. Pre-cut LATICRETE Waterproofing/Anti-Fracture Fabric (if required), allowing 2" (50mm) for overlap at ends and sides to fit the areas as required. Roll up the pieces for easy handling and placement. Shake or stir LATICRETE® HYDRO BAN® before using.

Pre-Treat Cracks and Joints - Fill all substrate cracks, cold joints and control joints to a smooth finish using a LATICRETE latex-fortified thin-set. Alternatively, a liberal coat* of LATICRETE HYDRO BAN applied with a paint brush or trowel may be used to fill in non-structural joints and cracks. Apply a liberal coat* of LATICRETE HYDRO BAN approximately 8" (200mm) wide over substrate cracks, cold joints, and control joints using a paint brush or heavy napped paint roller.

Pre-Treat Coves and Floor/Wall Intersections - Fill all substrate coves and floor/wall transitions to a smooth finish and changes in plane using a LATICRETE latex-fortified thin-set. Alternatively, a liberal coat* of LATICRETE HYDRO BAN applied with a paint brush or trowel may be used to fill in cove joints and floor/wall transitions $< \frac{1}{8}$ " (3mm) in width. Apply a liberal coat* of LATICRETE HYDRO BAN approximately 8" (200mm) wide over substrate cracks, cold joints, and control joints using a paint brush or heavy napped paint roller.

Pre-Treat Drains - Drains must be of the clamping ring type, with weepers as per ASME A112.6.3. Apply a liberal coat* of LATICRETE® HYDRO BAN® around and over the bottom half of drain clamping ring. Cover with a second liberal coat of LATICRETE HYDRO BAN.

When the LATICRETE HYDRO BAN dries, apply a bead of LATICRETE LATASIL™ where the LATICRETE HYDRO BAN meets the drain throat. Install the top half of drain clamping ring. Alternatively, linear drains may better accommodate large, thin porcelain tile installations. Apply LATICRETE HYDRO BAN to the surface of exposed drain flanges, in accord with LATICRETE instructions, and allow to dry completely.

Pre-Treat Penetrations - Allow for a minimum 1/8" (3mm) space between drains, pipes, lights, or other penetrations and surrounding Ceramic tile, stone or brick. Pack any gaps around pipes, lights or other penetrations with a LATICRETE latex-fortified thin-set. Apply a liberal coat* of LATICRETE HYDRO BAN around penetration opening. Cover the first coat with a second liberal coat* of LATICRETE HYDRO BAN. Bring LATICRETE HYDRO BAN up to level of tile or stone. When LATICRETE HYDRO BAN has dried to the touch seal with LATICRETE LATASIL™.

Main Application - Allow any pre-treated areas to dry to the touch. Apply a liberal coat* of LATICRETE® HYDRO BAN® with a paint brush or heavy napped roller over substrate including pre-treated areas and allow to dry to the touch. Install another liberal coat* of LATICRETE HYDRO BAN over the first coat. Let the top coat of LATICRETE HYDRO BAN dry to the touch approximately 1 – 2 hours at 70°F (21°C) and 50% RH. When the top coat has dried to the touch inspect the surface for pinholes, voids, thin spots or other defects. LATICRETE HYDRO BAN will dry to an olive green color when fully cured. Use additional LATICRETE HYDRO BAN to seal any defects.

Movement Joints - Apply a liberal coat* of LATICRETE HYDRO BAN, approximately 8" (200mm) wide over the areas. Then embed and loop the 6" (150mm) wide LATICRETE Waterproofing/Anti-Fracture Fabric and allow the LATICRETE HYDRO BAN liquid to bleed through. Immediately apply a second coat of LATICRETE HYDRO BAN.

*** Dry coat thickness is 20 – 30 mil (0.02 - 0.03" or 0.5 - 0.8mm); consumption per coat is approximately 0.01 gal/ft² (approx. 0.4 L/m²); coverage is approximately 100 ft² /gal (approx. 2.5 m²/ L). LATICRETE Waterproofing/Anti-Fracture Fabric can be used to pre-treat cracks, joints, curves, corners, drains, and penetrations with LATICRETE HYDRO BAN.**

Protection - Provide protection for newly installed membrane, even if covered with a thin-bed Ceramic tile, stone or brick installation against exposure to rain or other water for a minimum of 2 hours at 70°F (21°C) and 50% RH. For temperatures between 45°F and 69°F (7°C to 21°C) allow a minimum 24 hour cure period.

Flood Testing - Allow membrane to cure fully before flood testing, typically a minimum 2 hours at 70°F (21°C) and 50% RH. Cold conditions will require a longer curing time. For temperatures between 50°F and 69°F (10°C to 21°C) allow a minimum 24 hour cure period prior to flood testing.

Use the following LATICRETE System Materials:

LATICRETE HYDRO BAN

References:

LATICRETE Detail Drawings: [WP300](#), [WP301](#), [WP302](#), [WP303](#)

LATICRETE Data Sheets: [663.0](#), [663.5](#)

LATICRETE MSDS: [LATICRETE HYDRO BAN](#), [Fabric](#)
GREENGUARD Certificate: [LATICRETE HYDRO BAN](#)
LATICRETE Technical Data Sheets: [188](#), [189](#), [203](#)

B. *Waterproofing and Crack Isolation Membrane (Sheet Membrane):*

Measure and cut all of the LATICRETE® HYDRO BAN® Sheet Membrane sections and Sealing Tape strips to the proper size before mixing the substrate appropriate LATICRETE thin-set.

Mix the LATICRETE thin-set to a fairly wet consistency but still able to hold a notch. Dampen excessively dry porous surfaces in order to prevent premature drying and skinning of the thin-set. If skinning does occur remove thin-set and reapply using fresh mortar.

Pre-Treating (Corners and Coves): To create the watertight system, the installation process will rely on the layering of components; start with the corners: Apply thin-set mortar with a ¼"x 3/16" (6 mm x 5 mm) V-notched trowel. Press the LATICRETE® HYDRO BAN® pre-formed corner firmly into the thin-set. Remove any trapped air and guarantee full adhesion to the material by spreading the thin-set from the inside of the corner out using a trowel or straightedge with rounded corners. Continue with thin-set along the floor-to-wall transition from the corner outward for the first strip of LATICRETE HYDRO BAN Sealing Tape. Overlap the corners by 2" (50 mm). Lay the tape and remove all air pockets and excess material as with the corner piece. For any sections where two strips of LATICRETE HYDRO BAN Sealing Tape will be joined, be certain to overlap the material by 2" (50 mm). Continue with these steps around the perimeter of the installation. Treat the vertical corners with the LATICRETE HYDRO BAN Sealing Tape next in the same manner as the floor-to-wall transitions were installed. Overlap the corners by 2" (50 mm).

Pre-Treating (Penetrations): Treat pipe penetrations and mixing valves by applying thin-set mortar with a ¼"x 3/16" (6 mm x 5 mm) V-notched trowel. Slide the appropriate collar over the pipe or mixing valve and press firmly into the thin-set. The urethane rubber will seal around the pipe or mixing valve. Remove any trapped air and guarantee full adhesion to the material by spreading the thin-set from the inside out using a trowel or straightedge with rounded corners.

Main Application: Important, there should not be excessive overlapping. For example, at the corner, the LATICRETE HYDRO BAN Sealing Tape should overlap the LATICRETE HYDRO BAN Preformed Corner but not the adjacent LATICRETE HYDRO BAN Sealing Tape. Continue the same method to install the first LATICRETE HYDRO BAN Sheet Membrane section on the wall. Start in the completed corner and work your way out from the corner to the edge of the installation. Apply the thin-set to the surface of the wall with the ¼"x 3/16" (6 mm x 5 mm) V-notched trowel. If the surface is uneven, use a square-notched trowel with a wider tooth up to 3/8" (9 mm). Be sure to comb all of the thin-set in the same direction. Install the first length of sheet membrane. It may be easiest to unroll it up the wall or in the direction that you combed the thin-set. Remember to overlap the membrane by a minimum of 2" (5 cm). Be certain to leave at least ¼" (6mm) of space from the floor. Smooth the section of LATICRETE HYDRO BAN® Sheet Membrane with a flat trowel or roller from the middle towards the outside edges to assure that no air is trapped underneath. Follow the direction that the thin-set was combed onto the substrate. Use short, firm strokes to press out all of the excess thin-set and trapped air. Carefully remove or spread the excess thin-set over the seams. Apply the thin-set for the next length of LATICRETE HYDRO BAN Sheet Membrane section. Roll the next length upwards; smoothing it as it is pressed into the thin-set. If a bulge or crease appears during the unrolling, it is OK. Simply peel the section carefully away from the wall and reapply it so that it is flat. The sections are to be well-pressed; the use of a roller is recommended but this can also be accomplished with

a flat trowel. Squeeze out any extra thin-set at the seams; remove the excess or spread it uniformly down the seam. The remaining lengths can now be installed in this same manner. Best practice; sections of LATICRETE HYDRO BAN Sheet Membrane should be butt-jointed and the seam between the LATICRETE HYDRO BAN Sheet Membrane sections should be covered with LATICRETE HYDRO BAN Sealing Tape installed with the appropriate thin-set. Make sure that the LATICRETE HYDRO BAN Sealing Tape overlaps each LATICRETE HYDRO BAN Sheet Membrane section by a minimum of 2" (5 cm). The floor should be the last section installed. NOTE: Sections of LATICRETE HYDRO BAN Sheet Membrane may also be shingled (overlapped) during installation without the need for LATICRETE HYDRO BAN Sealing Tape. The top section must overlap a minimum of 2" (5cm) onto the bottom section of LATICRETE HYDRO BAN Sheet Membrane. If the LATICRETE HYDRO BAN Sheet Membrane is damaged after installation apply a patch of LATICRETE HYDRO BAN Sheet Membrane installed with the appropriate thin-set. The patch must overlap the damaged area by a minimum of 2" (5 cm). Tiling can begin immediately after installation when a flood test is not required.

Clamping Ring Drains: When installing LATICRETE HYDRO BAN Sheet Membrane with a clamping ring type drains with weepers as per ASME A112.6.3, lay the LATICRETE HYDRO BAN Sheet Membrane over the top of the drain and cut an x where each bolt will penetrate the membrane. Cut a hole in the membrane to allow the drain grate to be threaded into the clamping ring. (Use of a fabric circle cutter is recommended). Install the LATICRETE HYDRO BAN Sheet Membrane, making sure to align the previously cut holes for the bolts and drain throat. Ensure that the weep holes are not blocked. Apply bead of LATASIL™ to the clamping body just outside of the bolts, place clamping ring into position and tighten bolts. Check to make sure that weep holes are not plugged by any material. Alternatively, linear drains may better accommodate large, thin porcelain tile installations. Apply LATICRETE HYDRO BAN to the surface of exposed drain flanges, in accord with LATICRETE instructions, and allow to dry completely.

LATICRETE® HYDRO BAN® Bonding Flange Drains: Follow the instructions in [DS 035.0](#) for the installation of the LATICRETE HYDRO BAN Bonding Flange Drain in either a bonded or unbonded mortar bed. When the mortar is cured enough to walk on, prime the top of the LATICRETE HYDRO BAN Bonding Flange Drain, to the first 90 degree radius, and the adjusting ring with one coat of LATICRETE HYDRO BAN. Once the LATICRETE HYDRO BAN is dried to the touch the LATICRETE HYDRO BAN Sheet Membrane can be installed over it using a LATICRETE® polymer fortified thin-set. Insure that the LATICRETE HYDRO BAN Sheet Membrane extends to the first 90 degree radius of the LATICRETE HYDRO BAN Bonding Flange Drain. Apply thin-set mortar with a 1/4" x 3/16" (6mm x 5mm) V-notched trowel. Press the LATICRETE HYDRO BAN Sheet Membrane firmly into the adhesive. Remove any trapped air and guarantee full adhesion to the material by spreading the adhesive from the inside out using a trowel or straightedge with rounded corners. The adjusting ring is installed with a polymer fortified thin-set when installing the tile in order to line up the grate with the tile.

LATICRETE HYDRO BAN Linear Drains: Follow the instructions in [DS 034.0](#) for the installation of the LATICRETE HYDRO BAN Linear Drain in either a bonded or unbonded mortar bed. When the mortar is cured enough to walk on, prime the top of the LATICRETE HYDRO BAN Linear Drain flange, to the first 90 degree radius. Once the LATICRETE HYDRO BAN is dried to the touch the LATICRETE HYDRO BAN Sheet Membrane can be installed over it using a LATICRETE® polymer fortified thin-set. Apply thin-set mortar with a 1/4"x3/16" (6 mm x 5 mm) V-notched trowel. Press the LATICRETE HYDRO BAN Sheet Membrane firmly into the adhesive. Remove any trapped air and guarantee full adhesion to the material by spreading the adhesive from the inside out using a trowel or straightedge with rounded corners.

Flood Testing: Allow adhesive to cure fully before flood testing, a minimum of 24 hours after final cure at 70°F (21°C) and 50% RH. Cold and/or wet conditions will require a longer curing time.

Control Joints: Large thin porcelain tile installations must include sealant filled joints between the ceramic tile, stone or brick which is over any control joints in the substrate. However, the sealant filled joints can be offset horizontally by as much as one tile width from the substrate control joint location to coincide with the grout joint pattern.

Movement Joints: Large thin porcelain tile installations must include expansion joints at coves, corners, other changes in substrate plane and over any expansion joints in the substrate. Expansion joints in large thin porcelain tile work are also required at perimeters, at restraining surfaces, at penetrations and at the intervals described in the Tile Council of North America, Inc. (TCNA) Handbook Installation Method EJ171. Use LATICRETE LATASIL™ and backer rod.

Use the following LATICRETE System Materials:

LATICRETE HYDRO BAN Sheet Membrane

References:

LATICRETE Detail Drawings: [B300S](#), [B411S](#), [B412S Pan](#), [B412S Tub](#), [B413S](#), [B414S](#), [B415S](#), [B415LDS-Bonded Wall](#), [B415LDS EGP-Bonded Wall](#), [B415LDS EGP CBB-Bonded Wall](#), [B415LDS EGP Unbonded Medial](#), [B415LDS Unbonded Medial](#), [B419S](#), [B420S](#), [B421S](#), [B425S](#), [B426S](#), [B430S](#), [B431S](#), [B440S](#), [B441S](#), [SR613S](#), [SR614S](#)

LATICRETE Data Sheets: [041.0](#)

C. **LATICRETE® HYDRO BAN® Board (Interior Installation Only):**

WALLS:

Fastening (Wood Studs) - Nominal Dimensions – 2 inch x 4 inch (5 x 10 centimeters) minimum with maximum span of 16 inches on-center. Use a minimum of ½ inch (12 millimeter) LATICRETE® HYDRO BAN® Board, for 19.2 inch on-center stud spacing use a minimum of 5/8 inch (16millimeter) board. Fasten boards directly to studs using either LATICRETE HYDRO BAN Board 1 ¼ inch (32 millimeter) tab washer and the appropriate length LATICRETE HYDRO BAN Board screw for the thickness of the LATICRETE HYDRO BAN Board. Fasteners should be spaced 8 inches on-center. (20 centimeters). All fastener heads to be countersunk flush with surface of the board. Where two boards meet, the LATICRETE HYDRO BAN Board tab washer and LATICRETE HYDRO BAN Board screw are to span the interface.

Fastening (Steel Studs) - Minimum thickness – 25 gauge with maximum span of 16 inches on-center (41 centimeters). Use a minimum of ½ inches (12 millimeters) LATICRETE HYDRO BAN Board, for 19.2 inch on-center stud spacing use a minimum of 5/8 inch (16 millimeter) board. Fasten boards directly to studs using the LATICRETE® HYDRO BAN® Board 1 ¼ inch tab washer and 1 5/8 inch LATICRETE HYDRO BAN Board screw. Fasteners should be spaced 8 inches on-center (20 centimeters). All washers are to be countersunk flush with surface of the board. Where two boards meet, the LATICRETE HYDRO BAN Board tab washer and LATICRETE HYDRO BAN Board screw are to span the interface.

Installation (Option 1): The following steps must be followed to maintain the waterproof integrity of LATICRETE HYDRO BAN Board. Beginning at the bottom of the wall, install LATICRETE

HYDRO BAN Board to the wall studs by using the appropriate fastener and spacing outlined in the fastening section above. For tub walls and installations with LATICRETE HYDRO BAN Pre-Sloped Shower Pans first apply a bead of LATICRETE HYDRO BAN Adhesive & Sealant along the top edge of the tub or in the rabbet joint for the LATICRETE HYDRO BAN Pre-Sloped Shower Pans and then install the LATICRETE HYDRO BAN Board. For a waterproof system using LATICRETE HYDRO BAN embed 2 inch (50 millimeter) fiberglass mesh with LATICRETE HYDRO BAN liquid waterproofing membrane in all panel joints. All fasteners must be completely covered with LATICRETE HYDRO BAN liquid waterproofing membrane to form a seal. Allow 1st coat to dry and apply 2nd coat over all joints, corners and fasteners.

Installation (Option 2): Fasten boards in same manner as outlined in OPTION 1. For tub walls and installations with LATICRETE HYDRO BAN Pre-Sloped Shower Pans first apply a bead of LATICRETE HYDRO BAN Adhesive & Sealant along the top edge of the tub or in the rabbet joint for the LATICRETE HYDRO BAN Pre-Sloped Shower Pans and then install the LATICRETE HYDRO BAN Board. To create a watertight system using LATICRETE HYDRO BAN Sealing Tape, Inside or Outside Corners and Collars start with the corners. Apply a suitable LATICRETE polymer fortified thin-set mortar with a ¼ inch x 3/16 inch (6 millimeter x 5 millimeter) V-notched trowel. Press the pre-formed corner firmly into the adhesive. Remove trapped air and guarantee full adhesion to the material by spreading the adhesive from the inside out using a trowel or straightedge with rounded corners. Continue with thin-set along the floor-to-wall transition from the corner outward for the first strip of LATICRETE HYDRO BAN Sealing Tape. Overlap the corners by a minimum of 2 inches (50 millimeters). Lay the LATICRETE HYDRO BAN Sealing Tape and remove all air pockets and excess material as with the corner piece. For any sections where two strips of LATICRETE HYDRO BAN Sealing Tape will be joined, be certain to overlap the material by 2 inches (50 millimeters). Continue with these steps around the perimeter of the installation. Treat the vertical corners for the LATICRETE HYDRO BAN® Sealing Tape next in the same manner as the floor-to-wall transitions were installed. Overlap the corners by a minimum of 2 inches (50 millimeters). Treat pipe penetrations and mixing valves by applying thin-set mortar with a ¼ inch x 3/16 inch (6 millimeter x 5 millimeter) V-notched trowel. Slide the appropriate LATICRETE HYDRO BAN Collar over the pipe or mixing valve and press firmly into the adhesive. The urethane rubber will seal around the pipe or mixing valve. Remove any trapped air and guarantee full adhesion to the material by spreading the adhesive from the inside out using a trowel or straightedge with rounded corners. Fastener penetrations can be covered with LATICRETE HYDRO BAN Sealing Tape using a LATICRETE polymer fortified thin-set. Important, there should not be excessive overlapping. For example, at the corner, the LATICRETE® HYDRO BAN® Sealing Tape that leaves the corner and protects the floor-to-wall transitions should overlap with the pre-formed corner piece, but not the pre-formed corner piece and the adjacent LATICRETE HYDRO BAN Sealing Tape.

CEILINGS:

Framing members not exceed 16 inches on-center (41 centimeters). Use a minimum of ½ inch (12 millimeter) thick LATICRETE HYDRO BAN Board. Ensure that edges of LATICRETE HYDRO BAN Board are continuously supported. Fasten boards as outlined in FASTENING section for WALL applications.

- D. **LATICRETE® HYDRO BAN® Linear Drain:** Consult LATICRETE current published product data sheet (DS 034.0) for detailed design and installation instructions at www.laticrete.com.

3.4 INSTALLATION – LARGE THIN PORCELAIN TILE

- A. **General:** Install in accordance with current versions of American National Standards Institute, Inc. (ANSI) “**A108 American National Standard Specifications for Installation of Ceramic Tile**” and TCNA “**Handbook for Ceramic, Glass, and Stone Tile Installation.**” Cut and fit porcelain tiles neatly around corners, fittings, and obstructions. Perimeter pieces to be minimum half tile width. Chipped, cracked, split pieces and edges are not acceptable. Make joints even, straight, plumb and of uniform width to tolerance +/- 1/16" over 8' (1.5mm in 2.4m). Install divider strips at junction of flooring and dissimilar materials.

B. **Vapor Reduction Coating:**

Surface Preparation – Concrete slabs must be clean, structurally sound, absorptive, and have an ICRI concrete surface profile (CSP) of 3 - 5. All dirt, oil, paint, laitance, efflorescence, sealers, curing compounds and any other bond breaking contaminants must be removed down to the full depth of contamination by shot blasting or other mechanical means then swept and vacuumed clean. Use of chemicals to remove contaminants is prohibited. Use of sweeping compound is not recommended as they may contain oil which will act as a bond breaker. Do not use over gypsum or asphalt based products. Per ASTM F3010, concrete slab to receive LATICRETE® NXT™ Vapor Reduction Coating must have a tensile pull-off strength of 200 psi (1.4 MPa) or greater when tested in accordance with ASTM C1583. Surface temperature must be 50–90°F (10–32°C) during application and for 24 hours after installation. In all cases, the surface temperature of the prepared concrete slab must be warm enough to avoid condensation on the surface of the concrete.

Joints, Cracks, Surface Depressions and Other Irregularities - All joints and cracks should be evaluated and repaired if necessary prior to installation of LATICRETE NXT Vapor Reduction Coating. A good crack repair technique depends on knowing the causes and selecting appropriate repair procedures that take these causes into account. Repairing a crack without addressing the cause may only be a temporary fix. Successful long-term repair procedures must address the causes of the cracks as well as the cracks themselves. Refer to ACI 224.1R-07 for guidance on evaluation and repair of cracks in concrete. LATICRETE product application over moving cracks and joints is not recommended.

1. Moving joints (e.g. expansion joints, isolation joints, etc.) and dynamic (moving) cracks must be honored up through the LATICRETE® NXT™ Vapor Reduction Coating. LATICRETE is not responsible for vapor emission through untreated joints or for areas where cracks may develop later.
2. All non-moving joints and dormant cracks (e.g. saw cuts, surface cracks, grooves, control joints, etc.) must be cleaned out and free of all loose debris. Non-structural cracks up to 1/8" (3 mm) in width can be filled with LATICRETE NXT Vapor Reduction Coating epoxy during main application. Inspect these areas to ensure cracks are completely filled with no voids. Non-moving joints, dormant cracks greater than 1/8" (3 mm) wide, can be patched with mixture of 1 part LATICRETE NXT Vapor Reduction Coating and 3 parts clean, washed play sand. In a suitable container, such as an empty NXT Vapor Reduction Coating pail, pour 1 part LATICRETE NXT Vapor Reduction Coating pre-blended to 3 parts clean, washed play sand, using a 300 rpm drill with jiffy paddle, mix together for 2-3 minutes until the LATICRETE NXT Vapor Reduction Coating and qualified sand mixture is consistent. Slowly pour the mixture into the crack, using the flat side of a trowel force the epoxy/sand mixture into the crack. Surface crazing and hairline cracks do not need filling. Construction Joints, Expansion Joints and Large moving cracks that have lost aggregate lock (one side of crack is higher than the other) have structural implications and cannot be repaired using this method.

Moisture Evaluation - Moisture testing must be conducted in accordance with finish floor goods and adhesive manufacturers' requirements prior to LATICRETE NXT Vapor Reduction Coating application. When evaluating moisture conditions the HVAC system or a temporary enclosure must be operational and in place for the minimum specified time period recommended in the moisture test standard. The concrete floor slabs and the ambient air space above the floor must be at service temperature and relative humidity for at least 48 hours before taking moisture measurements in the concrete slab. These conditions must remain throughout the test period to ensure accurate results.

Mixing - Before using, store resins at room temperature 65-85°F (18-30°C) for 24 hours to ensure ease of mixing. Mix Components A and B at a ratio of 1:2.3 by volume (components are packaged into the pails to the specified ratio). Pour the A component into the larger B component steel pail. Verify that all of the Part A liquid is drained from pail. Mix with a slow speed drill (<300 RPM) with a jiffy blade for 3 minutes, assuring mixture is fully uniform and that all ribbons of contrasting shade are completely eliminated. Pour the fully mixed material onto the substrate immediately after mixing.

Application - Pour ribbons of LATICRETE® NXT™ Vapor Reduction Coating onto the prepared concrete and spread using appropriate round or square notch squeegee that is designed to apply the desired mil thickness in a single coat. Apply an even coat making sure to cover all areas thoroughly. Immediately following, while epoxy is still wet, use a high quality 3/8" (9 mm) nap non-shedding paint roller to back-roll at 90° from the squeegee direction to help ensure full coverage and uniform thickness. Replace worn squeegee blades and paint rollers when necessary to help ensure proper application. Use a paint brush to apply epoxy around penetrations, columns, and any other obstructions. Periodically check mil thickness using a LATICRETE NXT Wet Film Thickness Gauge. Allow to cure for 12 hours at 50-90°F (10-32°C) prior to installation of underlayment or finish flooring. Always consult flooring and adhesive manufacturer's installation instructions, restrictions and confirm compatibility with LATICRETE NXT Vapor Reduction Coating. Always test performance and compatibility of floor systems prior to application.

Coverage - Each full unit will yield approximately 650 - 1040 ft² (60.4 – 96.3 m²). Each mini unit will yield approximately 240 - 360 ft² (22.2 – 33.3 m²).

Flooring and Self Leveling Underlayments Installation - In all cases the LATICRETE NXT Vapor Reduction Coating surface must be protected from traffic, dust, debris, rain, and any other contaminants. LATICRETE NXT self-leveling underlayments shall be installed over LATICRETE NXT Vapor Reduction Coating as soon as the epoxy is slightly tacky to the touch with no transfer; typically 12 hours after application depending on ambient and substrate conditions. The maximum time to install LATICRETE® NXT™ self-leveling underlayments over LATICRETE NXT Vapor Reduction Coating is 24 hours. If LATICRETE NXT Vapor Reduction Coating is left open longer than 24 hours or the surface becomes contaminated, contact LATICRETE Technical Sales Representative. LATICRETE NXT self-leveling underlayments require the use of LATICRETE NXT Primer. Refer to TDS 230N for detailed primer installation instructions. If finish floor goods are to be installed directly on top of LATICRETE NXT Vapor Reduction Coating, then the epoxy surface must be allowed to cure until non-tacky to the touch, typically after a minimum of 24 hours. Always refer to finished floor manufacturer's recommendations regarding installation instructions, restrictions, moisture conditions and compatibility. Always test performance suitability and compatibility of finished floor systems

prior to their application. Sample surfaces should be installed as a field test so as to be representative of entire surface and tested for intended use.

Use the following LATICRETE System Materials:
LATICRETE NXT Vapor Reduction Coating

References:

LATICRETE Data Sheet: [507.0](#)

LATICRETE MSDS: [Part A](#); [Part B](#)

- B. **Bonded Thick Bed Method (Floor):** Verify 1“(25mm) nominal bed thickness has been allowed. Apply LATICRETE 254 Platinum with a flat trowel as a slurry bond coat approximately 1/16” (1.5mm) thick over clean concrete slab, in compliance with current revision of ANSI A108.1A (2.2 and 5.2). Place LATICRETE 3701 Fortified Mortar over slurry bond coat while LATICRETE 254 Platinum slurry bond coat is wet and tacky. Omit reinforcing wire fabric and fully compact bed by tamping. Clean excess mortar/adhesive from finished surfaces. Allow latex-Portland cement mortar beds to cure for a minimum of 7 days at 70°F (21°C) prior to installing large, thin porcelain tiles. For installation of large thin porcelain tiles over cured (pre-floated) latex-Portland cement thick bed mortar, follow appropriate **“Thin Bed Method.”**

Use the following LATICRETE System Materials:
LATICRETE 3701 Fortified Mortar
LATICRETE 254 Platinum

References:

LATICRETE Data Sheets: [100.0](#); [677.0](#)

LATICRETE MSDS: [3701FMB](#); [254](#)

GREENGUARD Certificates: [3701FMB](#), [254](#)

LATICRETE Technical Data Sheets: [106](#), [114](#), [154](#), [204](#)

- C. **Thick Bed (Wire Reinforced) Method:** Minimum bed thickness of 2” (50mm) must be maintained. Place latex-Portland cement thick bed mortar to a depth approximately one-half finished bed thickness in compliance with current revision of ANSI A108.01 (3.2.1.1 & 3.2.4) and A108.1B. Lay 2” x 2” (50mm x 50mm), 16 gauge (1.5mm), galvanized, welded reinforcing wire fabric, complying with ANSI A108.02 (3.7) and ASTM A185, over mortar. Place additional thick bed mortar over wire fabric and compact mortar by tamping with flat trowel. Screed mortar bed level and provide correct slopes to drains. Clean excess mortar/adhesive from finished surfaces. Allow latex-Portland cement mortar beds to cure for a minimum of 7 days at 70°F (21°C) prior to installing large, thin porcelain tiles. For installation of large thin porcelain tiles over cured (pre-floated) latex-Portland cement mortar bed, follow appropriate **“Thin Bed Method.”**

Use the following LATICRETE® System Materials:
LATICRETE® 3701 Fortified Mortar
LATICRETE 254 Platinum

References:

LATICRETE Data Sheets: [100.0](#); [677.0](#)

LATICRETE MSDS: [3701FMB](#); [254](#)

GREENGUARD Certificates: [3701FMB](#), [254](#)

LATICRETE Technical Data Sheets: [106](#), [114](#), [204](#)

- D. **Self-Leveling Underlayment:** Use LATICRETE NXT™ Level Plus, and related LATICRETE NXT Primer, as a self-leveling underlayment to attain proper floor flatness.

Surface Preparation - Concrete slabs must have a minimum ICRI concrete surface profile (CSP) of 3. For more detailed ICRI CSP information refer to ICRI Guideline No. 03732. Use of chemicals to remove contaminants or to create a surface profile is not recommended. Use of a sweeping compound is not recommended as they may contain oil which will act as a bond breaker. Additionally, concrete slabs must readily absorb water, be clean, free of oil, wax, grease, sealers, curing compounds, asphalt, paint, deicing agents, dust, dirt, loose surface material and any other contaminant that will act as a bond breaker. In addition, tensile strength testing of the concrete substrate, per ASTM C1583 or ICRI Guideline No. 03739, must show a minimum of 100 psi (0.7 MPa) tensile strength prior to installation of LATICRETE® self-leveling underlayment. Any areas that do not meet 100 psi (0.7 MPa) tensile strength must be removed and repaired.

General Priming Information: All surfaces must be primed prior to the installation of LATICRETE NXT™ self-leveling underlayments. LATICRETE® NXT™ Primer is a concentrate and must be diluted with clean potable water prior to application. Dilution ratio and application methods vary depending on substrate. Always stir or shake LATICRETE NXT Primer concentrate prior to diluting. Mix primer with clean potable water according to the **LATICRETE NXT Primer DILUTION / APPROXIMATE COVERAGE** chart below. Water must always be carefully measured in order to ensure proper dilution is achieved. Use a mixing paddle to thoroughly combine primer and water. LATICRETE NXT Primer can be broom, roller, mop, or spray applied. Substrate temperature must be a minimum 40°F (4°C) during primer application and throughout drying time. Additionally, air temperature must be maintained between 50–90°F (10–32°C) during primer application and throughout drying time. The primed surface must also be protected from weather, water and direct sunlight.

Normal Suction Concrete: Dilute LATICRETE® NXT™ Primer 1:3 (1 part primer to 3 parts water). Apply a single coat of diluted Primer/water mix to the point of refusal so that the substrate is completely covered and small puddles form in low spots. While LATICRETE NXT Primer is still wet use a push broom to work primer into the substrate so that puddles are spread evenly over the surface, absorbed and a uniform film has been applied. Remove any remaining puddles by brooming and spreading over the surface. Then proceed below to the **All Suitable Substrates** and **Protect Primer Application** sections.

High-Suction Concrete: Apply two coats of LATICRETE NXT Primer allowing adequate time to dry between coats. For the first coat, dilute LATICRETE NXT Primer 1:5 (1 part primer to 5 parts water). Apply first coat of diluted primer/water mix to the point of refusal so that the substrate is completely covered and small puddles form in low spots. While primer is still wet use a push broom to work primer into the substrate so that puddles are spread evenly over the surface, allowed to absorb and a uniform film remains on the surface. Remove any remaining puddles by brooming and spreading over the surface. Allow the primer to dry. The first coat is considered dry when a minimum of 3 hours dry time has elapsed, the primer turns from milky white to clear, is dry to the touch, and there is no release of primer from the substrate. First coat must not be opened to trade traffic prior to installation of second coat. If the primed floor becomes contaminated by trade traffic, construction dust, debris, or any other bond inhibiting substance, or is exposed to water/excessive moisture prior to second coat application, the contaminated first

coat of Primer must be completely removed by shot blasting, scarification or other mechanical means, properly re-primed and allowed to dry.

For the second coat, dilute LATICRETE® NXT™ Primer 1:3 (1 part primer to 3 parts water). Apply second coat of diluted primer/water mix to the point of refusal so that the substrate is completely covered and small puddles form in low spots. While second coat of primer is still wet use a push broom to work primer into the substrate so that puddles are spread evenly over the surface and a uniform film has been applied. Then follow the **All Suitable Substrates** and **Protect Primer Application** sections.

Non-Suction Substrates: Non-Suction substrate primer dilution and application instructions are intended for Ceramic tile, quarry tile, VCT, VAT, sheet vinyl and moisture mitigation systems that have been properly prepared in accordance with this guide and moisture mitigation manufacturer's instructions. Concrete slabs that are considered Non-Suction will require additional preparation prior to primer application. See **Non-Suction Concrete** in the **Substrate Types/General Requirements** section for more information.

Dilute LATICRETE NXT Primer 1:1 (1 part Primer to 1 part water). Apply a single coat of diluted primer/water mix to the point of refusal so that the substrate is completely and evenly covered. While primer is still wet and white, immediately lightly scatter LATICRETE NXT self-leveling dry powder into the wet primer. Using a push broom, work the dry powder into the wet primer/water mixture forming a slurry. Continue to broom so that puddles are spread evenly over the surface and a uniform film has been applied. Then follow **All Suitable Substrates** and **Protect Primer Application**. For more information on this method contact the Technical Service Department.

LATICRETE® NXT™ Vapor Reduction Coating / Moisture Mitigation Systems: Ensure that an acceptable system has been installed in accordance with manufacturer's instructions. If mitigation system manufacturer requires the use of a specific Primer, follow manufacturer's priming instructions using the required primer. If LATICRETE NXT primer will be used follow **Non-Suction Priming** instructions.

LATICRETE NXT Underlayments and other **Cement Mortar Beds:** Follow **High-Suction** priming instructions for priming on top of LATICRETE NXT underlayments and other cement mortar beds.

All Suitable Substrates: Remove any remaining puddles by brooming and spreading evenly over the surface. Allow the LATICRETE NXT Primer to completely dry for a minimum of 3 – 5 hours at 70°F (21°C) and 50% Relative Humidity. LATICRETE NXT Primer coat is considered dry when a minimum of 3 hours dry time has elapsed, the primer turns from milky white to clear, is dry to the touch, and there is no release of primer from the substrate. Surface may feel slightly tacky. Drying time will vary depending on surface and ambient air conditions. Substrate temperature must be a minimum 40°F (4°C) during primer application and throughout drying time. Additionally, air temperature must be maintained between 50–90°F (10–32°C) during primer application and throughout drying time. Primer must also be protected from weather and direct sunlight. Temperatures below 70°F (21°C) and/or relative humidity above 50% will increase drying time. Insufficient drying or poor film formation will result in pinholes and poor bond strength and may cause LATICRETE NXT self-leveling underlayment to debond. If primer dries within 30 minutes or if a 24 hour period is exceeded after primer application, the surface must be primed again.

Protect Primer Application: When walking over new primer application prior to installation of a LATICRETE NXT self-leveling underlayment, shoes must be protected with clean, slip-on type booties (i.e. Tyvek). Primed floor must not be opened to trade traffic prior to installation of LATICRETE NXT underlayments. If the primed floor becomes contaminated by trade traffic, construction dust, debris, or any other bond inhibiting substance, or is exposed to water/excessive moisture prior to second coat application, the contaminated first coat of primer must be completely removed by shot blasting, scarification or other mechanical means, properly re-primed and allowed to dry.

Mixing – LATICRETE NXT Level Plus should be mixed with 5.0 – 5.5 quarts (4.7–5.2 ℓ) of water per 55 lb. (25 kg) bag. Do not over water. For manual application, add product to water and mix for 2–3 min with a heavy duty drill (650 rpm) to obtain a lump free mix. LATICRETE NXT Level Plus can also be used in most pump equipment. Please consult with a LATICRETE representative to verify equipment compatibility. A flow test should always be performed to ensure that the mix is homogeneous and free from separation. The ideal flow range for LATICRETE NXT Level Plus is 11–12" (280 – 300 mm) using a LATICRETE Flow Test Kit. See TDS 235N –Flow Test Method - for more detailed instructions on performing flow tests.

Perimeter Isolation Strip - It is essential that all walls and building elements are isolated from the self-leveling underlayment pours to ensure proper expansion allowance against all restraining surfaces. Note: It is recommended to install a perimeter isolation strip before the installation of LATICRETE NXT Level Plus. Attach the perimeter isolation strip to the perimeter wall of the entire subfloor, as well as around the perimeter of any protrusions, in order to isolate the floor and wall/restraining surfaces. Temporarily fasten perimeter isolation strip in place with staples masking, duct, or carpet tape. The perimeter isolation strip can then be removed after the tiles have set firm. The joints can then be filled with LATICRETE LATASIL™.

Main Application - Substrate temperature should be between 40–90°F (4–32°C) during application and air temperature maintained between 50–90°F (10–32°C). Protect areas from direct sunlight. Do not use damp curing methods or curing and sealing compounds. If required to meet level tolerances, survey surface using a digital or electronic leveling device and apply level pegs as required. Adequate ventilation should be provided to ensure uniform drying. Pump or pour blended material onto substrate at an average thickness ranging between 1/8" to 1 1/4" (6–32 mm) for all surfaces. Immediately following placement lightly smooth the surface and pour lines, when not using elevation pins the use of a gauge rake will assist in controlling material depth. Do not expose LATICRETE self-leveling underlayments to rolling dynamic loads, such as forklifts or scissor lifts, for at least 72 hours after installation. Proper application is the responsibility of the user. Floor will be ready for foot traffic in 1-4 hours. Finished floor goods may be installed as soon as 16 hours after application of LATICRETE NXT Level Plus, subject to thickness, drying conditions and type of flooring materials. Coverage will be dependent upon relative rough-ness of substrate, but the following is typical: 1/8" thickness is approximately 49 ft²; 1/4" thickness is approx. 24 ft²; 1/2" thickness is approx. 12 ft²

Use the following LATICRETE® System Materials:

LATICRETE® NXT™ LEVEL PLUS
LATICRETE NXT PRIMER™

References:

LATICRETE Data Sheets: [505.0](#); [502.0](#)

LATICRETE MSDS: [NXT PRIMER](#); [NXT LEVEL PLUS](#)

- F. **Pre-float Method:** Over clean, dimensionally stable and sound concrete or masonry substrates, apply thick-bed mortar as scratch/leveling coat in compliance with current revision of A108.1A (1.0, 1.4 & 5.1). Float surface of scratch/leveling coat plumb, true and allow mortar to cure for 72 hours at 70 degrees Fahrenheit / 21 degrees Celsius. For installation of large, thin porcelain tile follow appropriate “**Thin Bed Method.**”

Use the following LATICRETE System Materials:

LATICRETE 3701 Fortified Mortar

LATICRETE 254 Platinum

References:

LATICRETE Data Sheets: [100.0](#), [677.0](#)

LATICRETE MSDS: [3701FMB](#), [254](#)

GREENGUARD Certificates: [3701FMB](#), [254](#)

LATICRETE Technical Data Sheets: [105](#), [106](#), [114](#), [118](#), [122](#), [128](#), [130](#), [143](#), [199](#), [204](#)

- G. **Lath & Plaster Method:** Install cleavage membrane complying with current revision of ANSI A108.02 (3.8 Membrane or cleavage membrane). Install metal lath complying with the current revision of ANSI A108.01 (3.3 Requirements for lathing and Portland cement plastering), ANSI A108.02 (3.6 Metal lath) and A108.1A (1.0 – 1.2, 1.4, & 5.1). Apply latex-Portland cement mortar as scratch/leveling coat over wire lath, concrete or masonry in compliance with current revision of ANSI A108.01 (3.3.5.1) and A108.1A (1.4). Float surface of scratch/leveling coat plumb, true and allow mortar to cure for 72 hours at 70 degrees Fahrenheit / 21 degrees Celsius. For installation of large, thin porcelain tile, follow appropriate “**Thin Bed Method.**”

Use the following LATICRETE® System Materials:

LATICRETE 3701 Fortified Mortar

LATICRETE 254 Platinum

References:

LATICRETE Data Sheets: [100.0](#), [677.0](#)

LATICRETE MSDS: [3701FMB](#), [254](#)

GREENGUARD Certificates: [3701FMB](#), [254](#)

LATICRETE Technical Data Sheets: [105](#), [106](#), [114](#), [118](#), [122](#), [130](#), [199](#), [204](#)

- H. **Thin Bed Method (walls and floors):** Installations are to comply with current revisions of ANSI A108.02, A108.1B and ANSI A108.5. Select an appropriately-sized ‘Euro-notch’ trowel (e.g. Tile Masters’ 1Y, 1YW, or 2YW trowels) or slant-notch trowel (e.g. Raimondi 5/16” x 5/16” or 8mm x 8mm) that will provide full bedding and coverage to the backs of the tiles. Use flat side of trowel to apply the adhesive mortar into full contact with the substrate. Immediately following, apply mortar with notched side of trowel. Spread only as much mortar as can be covered while the mortar surface is still wet and tacky. Mortar is to be applied to the panel backs using the notch side of the trowel. Trowel ridges on both the panel backs and substrate must be parallel to each other when panels are installed to assist in achieving 100% adhesive coverage to panel backs. **Floor installations:** Stand on the center of the panel and use short “shuffle-steps,” back-and-forth along the shortest panel dimension, to ensure complete mortar coverage and collapse mortar ridges. **Floor and wall installations:** Additionally, use vibrating palm sanders, with pads, to assist with releasing entrapped air from the beneath the panels and ensure complete mortar

coverage beneath the panel edges. Use mechanical edge-leveling systems to help minimize lippage between panel edges and ensure complete mortar coverage under panel edges. Consult edge-leveling system manufacturer for detailed instructions on use of their various systems. Clean excess latex Portland-cement mortar from faces of porcelain slabs and joints between pieces, immediately. Allow installation to cure for minimum 72 hours at 70° F (21° C), prior to grouting.

Use the following LATICRETE® System Materials:

LATICRETE® 254 Platinum

References:

LATICRETE Data Sheet: [677.0](#)

LATICRETE MSDS: [254](#)

GREENGUARD Certificate: [254](#)

LATICRETE Technical Data Sheets: [105](#), [118](#), [129](#), [209](#)

- I. **Epoxy Thin Bed Method (steel walls and floors):** For clean, rigid, steel substrates, install large porcelain slabs using LATAPOXY® 300 Adhesive. Install epoxy adhesive in compliance with current revisions of ANSI A108.02 (3.14) and ANSI A108.6. Select an appropriately-sized ‘Euro-notch’ trowel (e.g. Tile Masters’ 1Y, 1YW, or 2YW trowels) or slant-notch trowel (e.g. Raimondi 5/16” x 5/16” or 8mm x 8mm) that will provide full bedding and coverage to the panel backs. Use flat side of trowel to apply the adhesive mortar into full contact with the substrate. Immediately following, apply mortar with notched side of trowel. Spread only as much mortar as can be covered while the mortar surface is still wet and tacky. Mortar is to be applied to the panel backs using the notch side of the trowel. Trowel ridges on both the panel backs and substrate must be parallel to each other when panels are installed to assist in achieving 100% adhesive coverage to panel backs. **Floor installations:** Stand on the center of the panel and use short “shuffle-steps,” back-and-forth along the shortest panel dimension, to ensure complete mortar coverage and collapse mortar ridges. **Floor and wall installations:** Additionally, use vibrating palm sanders, with pads, to assist with releasing entrapped air from the beneath the panels and ensure complete mortar coverage beneath the panel edges. Use mechanical edge-leveling systems to help minimize lippage between panel edges and ensure complete mortar coverage under panel edges. Consult edge-leveling system manufacturer for detailed instructions on use of their various systems. Clean excess latex Portland-cement mortar from faces of porcelain slabs and joints between pieces, immediately. Allow installation to cure for minimum 72 hours at 70° F (21° C), prior to grouting.

Use the following LATICRETE System Materials:

LATAPOXY 300 Adhesive

References:

LATICRETE Data Sheets: [633.0](#)

LATICRETE MSDS: [300 Part A](#), [300 Part B](#), [300 Part C](#)

GREENGUARD Certificate: [300](#)

LATICRETE Technical Data Sheets: [105](#), [118](#), [128](#), [154](#), [199](#), [209](#)

J. **Grouting:**

1. **Polymer Fortified Cement Grout (ANSI A118.7):** **Surface Preparation**

Before starting to grout, remove spacers and debris in grout joints and remove dust and dirt using a wet sponge. Do not leave water standing in joints. Note: when grouting in hot weather refer to TDS 176 Hot Weather Tiling and Grouting. Substrate temperature must be between 40°F (4°C) and 90°F (32°C). Apply grout release or sealer if necessary. Refer to TDS 400 Grout Guide for more information on grouting.

Mixing

Use approximately 2 – 2.25 quarts (1.9 L – 2.1 L) of clean potable water for 2 PERMACOLOR Select Color Packs and 25 lbs (11.3 kg) of PERMACOLOR Select Grout Base. Do not use with 1776 Grout Enhancer or any other latex additive. Place water in a clean mixing container. Remove Color Packs from the cardboard container as well as the protective plastic sleeve. The internal bag is a water-dispersible pack – when using the 25 lbs. (11.3 kg) bag of PERMACOLOR Select, drop both color packs directly to water in clean mixing container. Mix with a drill mixer until pigment is dispersed evenly in container and the dispersible pack is no longer visible. Add PERMACOLOR Select Base. Mix with a slow speed drill mixer (300 rpm) for 1 minute. Wait for 5 minutes and remix with drill for 1 minute. If using the 12.5 lbs bag, drop only one color pack into 1 – 1.1 quarts (.8L – 1.0 L) of clean water.

Application

Clean tile surface with a damp sponge. Spread with a sharp, firm rubber grout float or wall float for narrow wall joints. To remove excess grout hold the float at a 90° angle and pull it at a 45° angle diagonally across the joints to avoid pulling out the material.

Note: If the grout begins to stiffen during installation, remix with drill mixer for 10–15 seconds. DO NOT ADD MORE WATER.

Cleaning

For first cleaning wait approximately 35 – 40 minutes at 70°F (21°C). Wider joints or cooler temperatures may extend wait time. Begin initial cleaning by lightly wiping down entire area to be cleaned with a damp sponge. Wash with a damp sponge (not wet). Work diagonally to the joints. Allow to dry 3 hours at 70°F (21°C). For second cleaning use a damp sponge or dry cloth to remove remaining grout haze.

Note: Use caution when polishing soft glazed tile or polished stone. If grout is to be sealed, LATICRETE generally recommends waiting a minimum of a 72 hours at 70°F (21°C) prior to sealing PERMACOLOR® Select, with a STONETECH® sealer.

Use the following LATICRETE System Materials:

LATICRETE PERMACOLOR Select

References:

LATICRETE Data Sheets: [281.0](#);

LATICRETE MSDS: [2500](#);

GREENGUARD Certificates: [2500](#);

LATICRETE Technical Data Sheets: [201](#), [400](#); [113](#); [174](#)

- K. **Expansion and Control Joints:** Provide control or expansion joints as located in contract drawings and in full conformity, especially in width and depth, with architectural details.
1. Substrate joints must carry through, full width, to surface of tile work.

2. Install expansion joints in tile work over construction/cold joints or control joints in substrates.
3. Install expansion joints where tiles abut restraining surfaces (such as perimeter walls, curbs, columns), changes in plane and corners.
4. Joint width and spacing depends on application - follow TCNA "**Handbook for Ceramic, Glass, and Stone Tile Installation**" Detail "EJ-171 Expansion Joints" or consult sealant manufacturer for recommendation based on project parameters.
5. Joint width: $\geq \frac{1}{8}$ " (3mm) and ≤ 1 " (25mm).
6. Joint width: depth ~2:1 but joint depth must be $\geq \frac{1}{8}$ " (3mm) and $\leq \frac{1}{2}$ " (12mm).
7. Layout (field defined by joints): 1:1 length: width is optimum but must be $\leq 2:1$. Remove all contaminants and foreign material from joint spaces/surfaces, such as dirt, dust, oil, water, frost, setting/grouting materials, sealers and old sealant/backer. Use LATICRETE® LATASIL™ 9118 Primer for permanent wet area installations. Install appropriate backing material (e.g. closed cell backer rod) based on expansion joint design and as specified in section 07 92 00. Apply masking tape to face of tiles for protection during sealant application. Use caulking gun, or other applicator, to completely fill joints with sealant. Within 5-10 minutes of filling joint, 'tool' sealant surface to a smooth finish. Remove masking tape immediately after tooling joint. Wipe excess sealant off all surfaces immediately.

Use the following LATICRETE System Materials:

LATICRETE LATASIL

LATICRETE LATASIL 9118 Primer

References:

LATICRETE Detail Drawings: [WP300](#), [WP301](#), [WP302](#), [WP303](#), [EJ-01](#), [EJ-06](#), [EJ-08](#), [EJ-09](#), [EJ-10](#), [EJ-12](#), [EJ-13](#), [EJ-14](#)

(Sealant treatments only)

LATICRETE Data Sheets: [6200.1](#), [6526.1](#)

LATICRETE MSDS: [LATASIL](#), [Primer](#)

LATICRETE Technical Data Sheets: [211](#), [252](#)

- L. **Adjusting:** Correction of defective work for a period of one (1) year following substantial completion, return to job and correct all defective work. Defective work includes, without limitation, tiles broken in normal abuse due to deficiencies in setting bed, loose tiles or grout, and all other defects which may develop as a result of poor workmanship.

3.5 CLEANING

Clean excess mortar/epoxy from tile work with water before they harden and as work progresses. Do not contaminate open grout/caulk joints while cleaning. Sponge and wash tile work diagonally across joints. Do not use acids for cleaning. Polish with clean dry cloth. Remove surplus materials and leave premises broom clean.

3.6 PROTECTION

- A. Protect finished installation under provisions of section 01 50 00. To avoid damage to finished tile work, schedule floor installations to begin only after all structural work, building enclosure, and overhead finishing work are completed.
- B. Keep all traffic off finished tile floors until they have fully cured. Builder shall provide up to $\frac{3}{4}$ " (19mm) thick plywood or OSB protection over non-staining Kraft® paper to protect floors after

installation material shall be cured. Covering the floor with polyethylene or plywood in direct contact with the floor may adversely affect the curing process of grout and latex/polymer fortified Portland cement mortars.

- C. Due to the slow rate of Portland cement hydration and strength development at low temperatures, protect installations exposed to these conditions from traffic for longer than normal periods. Protect newly installed exterior adhered veneer installations from direct exposure to rain for 7 days at 70 degrees Fahrenheit / 21 degrees Celsius. Protection applies to the substrate, the installation of adhesives and joint grouts, post-installation (rain and temperature protection) until suitable cure, and also the storage and handling of the cladding material. Extend period of protection of tile work at lower temperatures, below 60°F (15°C), and at high relative humidity (>70% R.H.) due to retarded set times of mortar/adhesives. For every 18°F (10°C) below 70°F (21°C) cementitious and epoxy materials take twice as long to cure. Large format tiles require longer curing periods in cooler temperatures. Keep all traffic off of finished work until full cure. Suitable protection is to be included in the scope of work. Each component must reach a proper cure prior to installing the subsequent installation product.
- D. Tent / shade and heat areas that will be subjected to the elements or freezing temperatures during installation and cure periods.
- E. Keep floors installed with epoxy adhesive closed to traffic for 24 hours at 70°F (21°C), and to heavy traffic for 48 hours @ 70°F (21°C) unless instructed differently by manufacturer. Use kneeling boards, or equivalent, to walk/work on newly tiled floors.
- F. Replace or restore work of other trades damaged or soiled by work under this section.

PART 4 – HEALTH AND SAFETY

The use of personal protection such as rubber gloves, suitable dust masks, safety glasses and industrial clothing is highly recommended. Discarded packaging, product wash and waste water should be disposed of as per local, state or federal regulations.

END OF SECTION

All references are the intellectual property of their respective owners:

TCNA Handbook for Ceramic, Glass and Stone Tile Installation 48th Edition. Tile Council of North America, Inc. Anderson, SC, 2011.

American National Standard Specifications for Installation of Ceramic Tile. Tile Council of North America, Inc. Anderson, SC, 2011.

Annual Book of ASTM Standards. American Society for Testing and Materials. West Conshohocken, PA, 2001.

ISO 13007 Ceramic Tiles – Grouts and Adhesives, International Standards Organization for Standardization (ISO), Geneva, Switzerland, 2004.

Floor and Trench Drains - ASME A112.6.3. American Society of Mechanical Engineers. New York, NY, 2001

International Building Code, International Code Council. Country Club Hills, IL, 2006.

International Residential Code for One- and Two-Family Dwellings, International Code Council. Country Club Hills, IL, 2006.

LEED Reference Guide for Green Building Design and Construction. U.S Green Building Council. Washington, D.C., 2009.

LEED Schools Reference Guide. U.S. Green Building Council. Washington, D.C., 2007

Lightweight Steel Framing Binder. Canadian Sheet Steel Building Institute. Cambridge, ON, Canada, 1991.

North American Specification for the Design of Cold-Formed Steel Structural Members. American Iron and Steel Institute. Washington D.C., 2001.

ICBO ER-4943P Product Technical Information. Steel Stud Manufacturers Association. Chicago, IL, 2001.

Steel Framing Systems Manual. Metal Lath Steel Framing Association. Chicago, IL.

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. Porcelain tile.
 - 2. Glazed wall tile.
 - 3. Stone thresholds.
 - 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 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. 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 sealers, indicating compliance with requirements for low-emitting materials.
- C. 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.
- D. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- E. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.
 - 2. Full-size units of each type of trim and accessory for each color and finish required.
 - 3. Stone thresholds in 6-inch (150-mm) lengths.
 - 4. Metal edge strips in 6-inch (150-mm) 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 and certified porcelain tile.

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. 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 wall tile installation.
 - 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. 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.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.3 TILE PRODUCTS

- A. As indicated.

2.4 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C503/C503M, with a minimum abrasion resistance of [10] [12] according to ASTM C1353 or ASTM C241/C241M and with honed finish.
 1. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.5 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. 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. Georgia-Pacific Gypsum LLC.
 - b. USG Corporation.
2. Thickness: 5/8 inch (15.9 mm).

2.6 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. LATICRETE SUPERCAP, LLC.
 - b. MAPEI Corporation.
- C. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. LATICRETE SUPERCAP, LLC.
 - b. MAPEI Corporation.

2.7 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. LATICRETE SUPERCAP, LLC.
 - b. MAPEI Corporation.
- C. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. LATICRETE SUPERCAP, LLC.
- b. MAPEI Corporation.

2.8 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 (0.1 mm) thick.
2. Reinforcing Wire Fabric: Galvanized, welded-wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM 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. (1.4 kg/sq. m)] [3.4 lb/sq. yd. (1.8 kg/sq. m)].
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. Standard Dry-Set Mortar (Thinset): ANSI A118.1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Bostik, Inc.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.
2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.

C. Modified Dry-Set Mortar (Thinset): ANSI A118.4.

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. ARDEX Americas.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.
- D. 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 (16 mm).
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. ARDEX Americas.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.
- E. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.
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. ARDEX Americas.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.
 2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.15.

2.9 GROUT MATERIALS

- A. Standard Cement Grout: ANSI A118.6.
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. ARDEX Americas.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.
- B. High-Performance Tile Grout: ANSI A118.7.
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. ARDEX Americas.
 - b. LATICRETE SUPERCAP, LLC.
 - c. MAPEI Corporation.
- C. Water-Cleanable Epoxy Grout: ANSI A118.3[, with a VOC content of 65 g/L or less].

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. LATICRETE SUPERCAP, LLC.
 - b. MAPEI Corporation.

2.10 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. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.
- 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.
- D. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

2.11 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 adhesives, bonded mortar bed or 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 adhesives or 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 (1:50) 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 (200 by 200 mm) 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. 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. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 2. 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.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Glazed Wall Tile: 1/8 inch (3.2 mm)]
 - 2. Porcelain Tile: 1/4 inch (6.4 mm)
- G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry-set improved modified dry-set mortar (thinset).
 - 2. Do not extend cleavage membrane, waterproof membrane or crack isolation membrane under thresholds set in mortar. Fill joints between such thresholds and adjoining tile with elastomeric sealant.
- I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- J. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

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. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

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. Porcelain Tile Installation TL-1: TCNA F122; thinset mortar on waterproof membrane.
 - a. Ceramic Tile Type: TL-1.
 - b. Thinset Mortar: Medium-bed, modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.
- B. Interior Wall Installations, Wood or Metal Studs or Furring:
 1. Porcelain Tile Installation TL-2: TCNA W243; thinset mortar on gypsum board.
 - a. Porcelain Tile Type: TL-2.
 - b. Install per tile manufacturer written instructions.
 - c. Thinset Mortar: Improved modified dry-set mortar.
 - d. Grout: High-performance unsanded grout.
 2. Porcelain Tile Installation TL-3: TCNA W243; thinset mortar on gypsum board.
 - a. Porcelain Tile Type: TL-2.
 - b. Install per tile manufacturer written instructions.
 - c. Thinset Mortar: Improved modified dry-set mortar.
 - d. Grout: High-performance unsanded grout.
 3. Ceramic Tile Installation CT-1: TCNA W245 or TCNA W248; thinset mortar on glass-mat, water-resistant gypsum backer board.
 - a. Ceramic Tile Type: CT-1.
 - b. Install per tile manufacturer written instructions.
 - c. Thinset Mortar: Modified dry-set or Improved modified dry-set mortar.
 - d. Grout: High-performance unsanded grout.

END OF SECTION 093013

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Samples.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 ACOUSTICAL PANELS ACT-1.

- A. Manufacturers: Subject to compliance with requirements, provide products by the following, or approved equal to match building standard:

- 1. Armstrong World Industries, Inc.

- B. Classification: As follows, per ASTM E 1264:

- 1. Type and Form: Type XX.
 - 2. Pattern: G smooth.
 - 3. LRC: Not less than 0.80.
 - 4. NRC: Not less than 0.55.
 - 5. CAC: Not less than 40.
 - 6. Surface-Burning Characteristics: Class A.

- C. Color: White or as selected.

- D. Edge Detail: Ultima Beveled Tegular.

- E. Thickness: 5/8 inch (15 mm).

- F. Modular Size: 24 by 24 inches (610 by 610 mm).

2.3 CEILING SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

- 1. Armstrong World Industries, Inc.

- B. Ceiling Suspension System: Silhouette 9/16" 1/8" Reveal Grid direct-hung system; ASTM C 635, intermediate-duty structural classification.

1. Face Design: Flat, flush.
 2. Face Finish: Painted white or in color as selected.
- C. Attachment Devices: Sized for 5 times the design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.
- D. Hangers:
1. Hangers shall be spaced a maximum of 4'-6" (1372 mm) on center.
 2. Hangers shall be a minimum 1/4" (6.4 mm) diameter galvanized steel rods or 1" x 1/8" thick (25 mm x 3.2 mm) flat steel bars. The use of steel wire as a hanger shall not be permitted.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install acoustical ceilings to comply with ASTM C 636/C 636M, as modified by the Building Code of the City of New York, and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
- C. Arrange directionally patterned acoustical units as indicated on Drawings.

END OF SECTION 095113

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

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.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit EQ 4.1: For adhesives, include printed statement of VOC content and chemical components.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated, in manufacturer's standard-size samples of each resilient product color, texture, and pattern required.
- E. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.4 QUALITY ASSURANCE

- A. Installation Qualification: Contractors for floor covering installation should be experienced in managing commercial flooring projects and provide professional installers, qualified to install the various flooring materials specified. An installer is "qualified" if trained, or a certified by Tarkett or a certified INSTALL (International Standards & Training Alliance) resilient floor covering installer.
- B. Mockups: Provide resilient products with mockups specified in other Sections.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

1.6 PROJECT CONDITIONS

- A. Install resilient products after other finishing operations, including painting, have been completed.
- B. Maintain ambient temperatures within range recommended by Tarkett, but not less than 65 deg F (18 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- C. Maintain the ambient relative humidity between 40% and 60% during installation.
- D. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

PART 2 - PRODUCTS

2.1 RESILIENT BASE

Manufacturer: As indicated.

2.2 INSTALLATION MATERIALS

- A. Adhesives: as recommended by manufacturer to meet site conditions

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 of resilient products.
- 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 resilient wall base.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

- D. Vacuum clean substrates to be covered by resilient products immediately before installation.

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 practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
- 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.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data and Samples.
- B. Extra Materials: Deliver to Owner one box of each type and color of resilient floor tile installed.

PART 2 - PRODUCTS

2.1 SOLID VINYL TILE

- A. As indicated on drawings.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement- or blended-hydraulic-cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.
 - 1. Low-Emitting Materials: Comply with Section 018113.17 - Sustainable Design Requirements - LEED v4 ID+C.
- C. Floor Polish: Protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. It is recommended that resilient floorcovering installation shall not begin until all other trades are completed. All substrates to receive LVT require proper moisture testing.
- B. Use only Portland based patching and leveling compounds. Do not install resilient floorcovering over gypsum-based patching and/or leveling compounds. Material should always be visually inspected prior to installation.
- C. Do not install on stairs, ramps, or inclines.

- D. When moving any type of furniture or heavy equipment, protect the floor by covering with plywood, Masonite or other hard shell material to prevent scratching or permanent damage.
- E. Use appropriate protectors under furniture. These should be felt or other soft material specifically designed to protect the hard surface from scratches or damage to the wear layer.
- F. Flooring material and adhesive must be acclimated to the installation area a minimum of 48 hours prior to installation.
- G. Store cartons of tile or plank products flat and squarely on top of one another. Preferably, locate material in the “center” of the installation area (i.e. away from vents, direct sunlight, etc.). Storing cartons in direct sunlight may affect proper acclimation by inducing thermal expansion/contraction.
- H. When palletizing on a jobsite, vinyl tiles (squares or planks) need to be stacked two (2) rows high side by side with no airspace between and then quarter turned for two (2) rows side by side, not to exceed 12 boxes high. A 5/8” or thicker plywood must also be placed on the pallet first. Do not stack pallets two (2) high unless utilizing a 3/4” thick plywood cap between pallets.
- I. New concrete needs at least 90 days to dry under ideal conditions. Lightweight concrete and concrete poured above grade in metal pans take a considerably longer time to dry. Installation cannot begin until it is fully dried and in compliance with moisture and alkalinity requirements.
- J. Areas to receive resilient flooring should be adequately illuminated during all phases of the installation process.
- K. Controlled environments are critical. Fully functional HVAC systems are the best way to ensure temperature and humidity control.
- L. DO NOT install resilient flooring products until the work area can be temperature controlled.
- M. The temperature of your job site must stay within 65°F (18.3°C) and 85°F (29.5°C) with relative humidity between 40% - 65% for 48 - 72 hours prior to, during, and after installation.
- N. Before installing, all concrete floors, regardless of age, must comply with the moisture and pH requirements stated in Interface Installation guidelines, and must otherwise be suitable for LVT installation. The moisture conditions of the concrete should be determined by use of the In Situ probe relative humidity (RH) test method..
- O. Substrates shall be smooth, structurally sound, dry, clean and free of all foreign material such as dust, wax, solvents, paint, grease, oils, old adhesive residue, curing/hardening compounds, sealers and other foreign material.
- P. LEVELNESS - Concrete floors shall be flat and smooth within 1/8” in 6 feet or 3/16” in 10 feet.
- Q. Prepare concrete substrates according to ASTM F 710.
- R. All concrete floors, old and new, should be tested for alkalinity using an approved pH test kit. The approved pH test kit should include pH test strips capable of measuring a range of 0 -14 along with deionized or distilled water. The area to be tested must be weather-tight and

conditioned, via the building's HVAC system, to a temperature range of 65° - 85°F (18° - 29°C) and a relative humidity range of 40% - 60%. These temperature and humidity ranges must be maintained for at least 48 hours prior to commencing the test and at all times during the test. The concrete surface temperature should not be less than 65°F (18°C).

- S. All adhesives, coatings, finishes, dirt, curing compounds, sealants and other substances should be removed from the area to be tested. Non-chemical methods, such as sanding, grinding, or bead blasting should be used to remove these substances to achieve an appropriate state for testing. Any cleaning should take place a minimum of 48 hours before testing.
- T. Once the above conditions have been met:
 - 1. Abrade the surface using 100 grit sand paper to a minimum depth of 1/32" but no more than 1/8".
 - 2. Apply a small amount (approximately 1" in diameter) of de-ionized or distilled water.
 - 3. Allow the de-ionized/distilled water to stand for 60 seconds.
 - 4. Dip the 0-14 pH test strip into the puddle and remove.
 - 5. Allow the test strip to stand for 15 seconds.
 - 6. Compare to the pH chart in the test kit to determine pH level.
 - 7. At least three pH tests must be performed for the first 1,000 square feet of space. One additional test should be performed for each additional 1,000 square feet thereafter.
- U. The concrete slab should have an alkalinity level between 7.0 and 9.0 to be suitable for LVT installation without a primer except in the case of installation using XL Brands HM99 High Moisture Adhesive or XL Brands Adhesive 3800.
- V. Lay out tiles so tile widths at opposite edges of room are equal and are at least one-half of a tile.
- W. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged. Lay tiles in patterns indicated.
- X. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.
 - 1. Apply three coat(s).

END OF SECTION 096519

SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product data and Samples.
- B. Extra Materials: Deliver to Owner full-width rolls of wall covering equal to 5 percent of amount of each type installed, packaged with protective covering for storage.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Flame-spread and smoke-developed indexes of not more than 25 and 450, respectively, per ASTM E 84.

2.2 VINYL WALL COVERING

- A. Wall Covering: As indicated.
- B. Manufacturer: As indicated.
- C. Product #: As indicated.
- D. Color: As indicated.
- E. ACCESSORIES
- F. Adhesive: Mildew-resistant, nonstaining, adhesive, for use with specific wall covering and substrate application, as recommended in writing by wall covering manufacturer.
- G. Primer/Sealer: Mildew-resistant primer/sealer complying with Section 099123 "Interior Painting" and recommended in writing by wall covering manufacturer for intended substrate.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Preparation:
 - 1. Clean substrates of substances that could impair wall covering's bond, including dirt, oil, grease, mold, mildew, and incompatible primers.

2. Prepare substrates to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, and defects.
 3. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
 4. Prime new gypsum board.
 5. Allow new plaster to cure. Neutralize areas of high alkalinity and prime.
 6. Treat areas of painted surfaces susceptible to pigment bleeding. Sand gloss, semigloss, and eggshell finishes with fine sandpaper.
 7. Acclimatize wall covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.
- B. Install seams vertical and plumb, with no horizontal seams.
- C. Match pattern 72 inches (1830 mm) above finish floor.
- D. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces using cleaning methods recommended by wall covering manufacturer. Replace strips that cannot be cleaned.

END OF SECTION 097200

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals:
 - 1. Product Data.
 - 2. Samples.
- B. Extra Materials: Deliver to Owner 1 gal. (3.8 L) of each color and type of finish-coat paint used on Project, in containers, properly labeled and sealed.

PART 2 - PRODUCTS

2.1 PAINT

- A. MPI Standards: Provide materials that comply with MPI standards indicated and listed in its "MPI Approved Products List."
 - 1. Block Filler, Latex: MPI #4.
 - 2. Primer, Alkali Resistant, Water Based: MPI #3.
 - 3. Primer, Bonding, Water Based: MPI #17.
 - 4. Primer, Bonding, Solvent Based: MPI #69.
 - 5. Primer, Alkyd, Anticorrosive: MPI #79.
 - 6. Primer, Galvanized, Water Based: MPI #134.
 - 7. Primer, Quick Dry, for Aluminum: MPI #95.
 - 8. Primer, Latex: MPI #6.
 - 9. Primer, Alkyd: MPI #5.
 - 10. Latex, Exterior Flat (Gloss Level 1): MPI #10.
 - 11. Latex, Exterior Low Sheen (Gloss Level 3-4): MPI #15.
 - 12. Latex, Exterior Semigloss (Gloss Level 5): MPI #11.
 - 13. Latex, Exterior, Gloss (Gloss Level 6): MPI #119.
 - 14. Light Industrial Coating, Exterior, Water Based (Gloss Level 3): MPI #161.
 - 15. Light Industrial Coating, Exterior, Water Based, Semigloss (Gloss Level 5): MPI #163.
 - 16. Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6): MPI #164.
 - 17. Alkyd, Exterior Flat (Gloss Level 1): MPI #8.
 - 18. Alkyd, Exterior, Semigloss (Gloss Level 5): MPI #94.
 - 19. Alkyd, Exterior Gloss (Gloss Level 6): MPI #9.
 - 20. Alkyd, Quick Dry, Semigloss (Gloss Level 5): MPI #81.
 - 21. Alkyd, Quick Dry, Gloss (Gloss Level 7): MPI #96.
 - 22. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3): MPI #60.
 - 23. Floor Enamel, Alkyd, Gloss (Gloss Level 6): MPI #27.

- B. Material Compatibility: Provide materials that are compatible with one another and with substrates.
 - 1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. Colors: As selected.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.
- C. Clean and prepare surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Paint exposed surfaces, new and existing, unless otherwise indicated.
 - 1. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.
- C. Apply paints according to manufacturer's written instructions.
 - 1. Use brushes only where the use of other applicators is not practical.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
 - 1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

3.3 EXTERIOR PAINT APPLICATION SCHEDULE

- A. Concrete, Nontraffic Surfaces:
 - 1. Low-Sheen Latex: Two coats: MPI EXT 3.1A.

B. Concrete, Traffic Surfaces:

1. Low-Gloss Latex Floor Paint: Two coats: MPI EXT 3.2A.

C. Clay Masonry:

1. Low-Sheen Latex: Two coats: MPI EXT 4.1A.

D. Concrete Masonry Units:

1. Low-Sheen Latex: Two coats over latex block filler: MPI EXT 4.2A.

E. Galvanized Metal:

1. Semigloss, Alkyd: Two coats over primer recommended by topcoat manufacturer for exterior use on galvanized-metal.

F. Aluminum:

1. Semigloss, Alkyd: Two coats over quick-drying primer for aluminum: MPI EXT 5.4F.

G. Exterior Gypsum Soffit Board:

1. Low-Sheen Latex: Two coats: MPI EXT 9.2A.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: Include printout of MPI's "MPI Approved Products List" with product highlighted.
2. Samples, 12" x 12" minimum size.

B. Mockups: Full-coat finish Sample of each type of coating, color, and substrate, applied where directed.

C. Extra Materials: Deliver to Owner 1 gal. (3.8 L) of each color and type of finish-coat paint used on Project, in containers, properly labeled and sealed.

PART 2 - PRODUCTS

2.1 PAINT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Behr Process Corporation.
2. Benjamin Moore & Co.
3. Pratt & Lambert.
4. Sherwin-Williams Company (The).
5. Zinsser; Rust-Oleum Corporation.

B. MPI Standards: Provide materials that comply with MPI standards indicated and listed in its "MPI Approved Products List."

1. Block Filler, Latex: MPI #4.
2. Primer Sealer, Latex: MPI #50.
3. Primer, Alkali Resistant, Water Based: MPI #3.
4. Primer Sealer, Institutional Low Odor/VOC: MPI #149.
5. Primer, Latex, for Interior Wood: MPI #39.
6. Primer Sealer, Alkyd, Interior: MPI #45.
7. Primer, Bonding, Water Based: MPI #17.
8. Primer, Bonding, Solvent Based: MPI #69.
9. Primer, Alkyd, Anticorrosive: MPI #79.
10. Primer, Galvanized, Water Based: MPI #134.
11. Primer, Quick Dry, for Aluminum: MPI #95.
12. Latex, Interior, Flat, (Gloss Level 1): MPI #53.
13. Latex, Interior, (Gloss Level 2): MPI #44.

14. Latex, Interior, (Gloss Level 4): MPI #43.
 15. Latex, Interior, Semigloss, (Gloss Level 5): MPI #54.
 16. Latex, Interior, Gloss, (Gloss Level 6, except Minimum Gloss of 65 Units at 60 Degrees): MPI #114.
 17. Latex, Institutional Low Odor/VOC, Flat (Gloss Level 1): MPI #143.
 18. Latex, Institutional Low Odor/VOC, (Gloss Level 2): MPI #144.
 19. Latex, Institutional Low Odor/VOC, Semigloss (Gloss Level 5): MPI #147.
 20. Latex, High-Performance Architectural, (Gloss Level 2): MPI #138.
 21. Latex, High-Performance Architectural, Semigloss (Gloss Level 5): MPI #141.
 22. Alkyd, Interior, Flat (Gloss Level 1): MPI #49.
 23. Alkyd, Interior, Semigloss (Gloss Level 5): MPI #47.
 24. Alkyd, Interior, Gloss (Gloss Level 6): MPI #48.
 25. Alkyd, Quick Dry, Semigloss (Gloss Level 5): MPI #81.
 26. Alkyd, Quick Dry, Gloss (Gloss Level 7): MPI #96.
 27. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3): MPI #60.
 28. Floor Enamel, Alkyd, Gloss (Gloss Level 6): MPI #27.
- C. Material Compatibility: Provide materials that are compatible with one another and with substrates.
1. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- D. Paints and coatings shall comply with the following limits for VOC content:
1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints, Coatings: 150 g/L.
 3. Primers, Sealers, and Undercoaters: 200 g/L.
 4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 5. Floor Coatings: 100 g/L.
- E. Colors: As selected.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, lighting fixtures, and similar items that are not to be painted. Mask items that cannot be removed. Reinstall items in each area after painting is complete.
- C. Clean and prepare surfaces in an area before beginning painting in that area. Schedule painting so cleaning operations will not damage newly painted surfaces.

3.2 APPLICATION

- A. Comply with recommendations in MPI's "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Paint exposed surfaces, new and existing, unless otherwise indicated.
 - 1. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.
 - 2. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint the back side of access panels.
 - 4. Color-code mechanical piping in accessible ceiling spaces.
 - 5. Do not paint prefinished items, items with an integral finish, operating parts, and labels unless otherwise indicated.
- C. Apply paints according to manufacturer's written instructions.
 - 1. Use brushes only where the use of other applicators is not practical.
 - 2. Use rollers for finish coat on interior walls and ceilings.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
 - 1. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

3.3 INTERIOR PAINT APPLICATION SCHEDULE

- A. Concrete, Nontraffic Surfaces:
 - 1. Gloss Level 2 Institutional Low-Odor/VOC Latex: Two coats over low-odor/VOC primer/sealer: MPI INT 3.1M.
- B. Concrete, Traffic Surfaces:
 - 1. Gloss Alkyd Floor Enamel: Two coats: MPI INT 3.2B.
- C. Concrete Masonry Units:
 - 1. Gloss Level 2 Institutional Low-Odor/VOC Latex: Two coats over latex block filler: MPI INT 4.2E.
- D. Steel:
 - 1. Gloss Level 2 Latex: Two coats over alkyd anticorrosive primer: MPI INT 5.1Q.
- E. Fiberglass and Plastic:
 - 1. Gloss Level 2 Latex: Two coats over (water-based) bonding primer: MPI INT 6.7A.
- F. Gypsum Board:

1. Flat or Gloss Level 2 Institutional Low-Odor/VOC Latex: Two coats over low-odor/VOC primer/sealer: MPI INT 9.2M.

END OF SECTION 099123

SPECIFICATION - SECTION 102226 (10650) OPERABLE 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. This Section includes the following:

1. Manually operated, individual panel operable partitions.

B. Related Sections include the following:

1. Division 03 Sections for concrete tolerances required.
2. Division 05 Sections for primary structural support, including pre-punching of support members by structural steel supplier per operable partition supplier's template.
3. Division 06 Sections for wood framing & supports, and all blocking at head and jambs as required.
4. Division 09 Sections for wall and ceiling framing at head and jambs.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: 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 to that indicated for this Project.

B. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure and classified in accordance with ASTM E413 to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.

C. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.

D. The operable wall must be manufactured by a certified ISO-9001-2015 company or an equivalent quality control system.

1.4 REFERENCE STANDARDS

A. ASTM International

1. ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.
2. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
3. ASTM E84 - Surface Burning Characteristics of Building Materials.
4. ASTM E413 - Classification for Rating Sound Insulation

B. Health Product Declaration Collaborative

1. Health Product Declaration Open Standard v2.1

C. International Standards Organization

1. ISO 14021 - Environmental Labels and Declarations - Self-Declared Environmental Claims (Type II Environmental Labeling).
2. ISO 14025:2011-10, Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures.
3. ISO 14040:2009-11, Environmental Management - Life Cycle Assessment - Principles and Framework.
4. ISO 14044:2006-10, Environmental Management - Life Cycle Assessment - Requirements and Guidelines.
5. ISO 21930 – Sustainability in Buildings and Civil Engineering Works — Core Rules for Environmental Product Declarations of Construction Products and Services.

D. Other Standards

1. ADA – Americans with Disabilities Act.

1.5 SUBMITTALS

- A. Product Data: Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable partition, component, and accessory specified.
- B. Shop Drawings: Show location and extent of operable partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. 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.
- C. Setting Drawings: Show imbedded items and cutouts required in other work, including support beam punching template.
- D. Samples: Color samples demonstrating full range of finishes available by architect. Verification samples will be available in same thickness and material indicated for the work.
- E. Reports: Provide a complete and unedited written sound test report indicating glass thickness and spacing in test specimen matches product as submitted.
- F. Create spaces that are healthy for occupants.
 1. Furnish products and materials with Health Product Declaration (HPD), Manufacturer Inventory, or other material health disclosure documentation. Products without an HPD or other disclosure documentation are not acceptable.
- G. Furnish materials that generate the least amount of pollution.
 1. Furnish products and materials that have third party verified environmental product declarations (EPD's). Consider products and materials that have optimized environmental performance (reduced life cycle impacts). Products without an EPD or other disclosure documentation are not acceptable.
- H. Buy American: Operable partition to be manufactured in the United States in compliance with applicable U.S. Federal Trade Commission (FTC) and U.S. Customs Service and Border Protections regulations and be labeled "Made in America".

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.
- B. Protect panels during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.

1.7 WARRANTY

- A. Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.
- B. Warranty period: Three (3) years.

PART 2 – PRODUCTS

2.1 MANUFACTURERS, PRODUCTS, AND OPERATION

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Modernfold, Inc.
- B. Panels to be manufactured in the U.S.A.
- C. Products: Subject to compliance with the requirements, provide the following product:
 - 1. Acousti-Seal Encore™ – Single Panel: Manually operated individual panel operable partition.

2.2 OPERATION

- A. Acousti-Seal Encore™ – Single Panel: Series of individual flat panels, manually operated, top supported with operable floor seals and automatic top seals.
- B. Final Closure:
 - 1. Horizontally expanding panel edge with removable crank

2.3 PANEL CONSTRUCTION

- A. Nominal 4-1/4-inch (108 mm) thick panels in manufacturer's standard 51-inch (1295 mm) widths. All panel horizontal and vertical framing members fabricated from minimum 16-gage formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.
- B. Panel Skin Options:
 - 1. Roll-formed steel wrapping around panel edge. Panel skins shall be lock formed and welded directly to the frame for unitized construction. Acoustical ratings of panels with this construction (select one):
 - a. 52 STC - 21-gage steel
 - b. 54 STC - 21-gage steel
 - c. 56 STC - 16-gage steel
- C. Hinges for Pass Doors, and Pocket Doors shall be (select one):
 - 1. Full leaf butt hinges, attached directly to panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame. Lifetime Warranty on hinges. Hinges mounted into panel edge or vertical astragal are not acceptable.
 - 2. SOSS® Invisible laminated hinge with antifriction segments mounted between each heat-treated link. Hinge to be attached directly to panel frame. Welded internal hinge bracket shall support the hinge and allow for adjustment of hinge plates. Concealed hinges mounted into panel edge or vertical astragal are not acceptable.

D. Panel Trim: No vertical or horizontal trim required or allowed on edges of panels; minimal groove appearance at panel joints.

E. Panel Weight:

Steel Skin

1. 52 STC – 8.2 lbs./square foot
2. 54 STC – 9.5 lbs./square foot
3. 56 STC – 11.9 lbs./square foot

2.4 PANEL FINISHES

A. Panel face finish shall be (select as required):

1. Reinforced vinyl with woven backing weighing not less than 20 ounces (567 g) per lineal yard.
2. Reinforced heavy-duty vinyl with woven backing weighing not less than 30 ounces (850 g) per lineal yard.
3. Acoustical, non-woven needle punch carpet, with fused fibers to prevent unraveling or fray of material.
4. Wall covering and upholstery fabric with surface treatment to resist stains.
5. Customer's own material (subject to factory approval).
6. Full height steel markerboard work surface.
7. Full height 1/4-inch (6.35 mm) natural cork tackboard with vinyl or fabric covering.
8. Uncovered for field finishing.
9. Primed for field finishing.

B. Panel trim: No exposed panel trim required or allowed, hardware to be of one consistent color (select one):

1. Dark Bronze
2. Smoke Gray
3. Natural Choice

2.5 SOUND SEALS

A. Vertical Interlocking Sound Seals between panels: Roll-formed steel astragals, with tongue and groove configuration in each panel edge. Rigid plastic or aluminum astragals are not acceptable.

B. Horizontal Top Seals shall be Modernfold SureSet™ automatic operable top seals, manually operated operable top seals not required or permitted.

C. Horizontal Bottom Seals shall be Modernfold SureSet™ bottom seal (select one):

1. SA2 - Automatic bottom seals providing nominal 2-inch (51 mm) operating clearance with an operating range of +1/2-inch (13 mm) to -1-1/2-inch (38 mm) which automatically drop as panels are positioned, without the need for tools or cranks. Extended seal shall exert nominal 120 pounds (54 kg) downward force to the floor throughout operating range.
2. SA4 - Automatic bottom seals providing nominal 4-inch (102 mm) operating clearance with an operating range of +1/2-inch (13 mm) to -3-1/2-inch (89 mm) which automatically drop as panels are positioned, without the need for tools or cranks. Extended seal shall exert nominal 120 pounds (54 kg) downward force to the floor throughout operating range.
3. SM2 - Manually activated seals providing nominal 2-inch (51 mm) operating clearance with an operating range of +1/2-inch (13 mm) to -1-1/2-inch (38 mm). Seal shall be operable from panel edge or face. Extended seal shall exert nominal 120 pounds (54 kg) downward force to the floor throughout operating range.
4. SM4 - Manually activated bottom seals providing nominal 4-inch (102 mm) operating clearance with an operating range of +1/2-inch (13 mm) to -3-1/2-inch (89 mm). Seal shall be operable from panel edge or face. Extended seal shall exert nominal 120 pounds (54 kg) downward force to the floor throughout operating range.

2.6 SUSPENSION SYSTEM (select one)

A. #17 Suspension System - Smart Track™

1. Suspension Tracks: Minimum 11-gage, 0.12-inch (3.04 mm) roll-formed steel track, supported by adjustable steel hanger brackets, supporting the load-bearing surface of the track, connected to structural support by pairs of 3/8-inch (9.5 mm) diameter threaded rods. Aluminum track is not acceptable.
 - a. Exposed track soffit: Steel, integral to track, and pre-painted off-white.
2. Carriers: Two all-steel trolleys with steel-tired ball bearing wheels. Non-steel tires are not acceptable. Suspension system shall provide automatic indexing of panels into stack area using preprogrammed switches and trolleys without electrical, pneumatic, or mechanical activation.
3. Warranty period: Five (5) years.

- OR -

B.#14 Suspension System - Smart Track™

1. Suspension Tracks: Minimum 7-gage, 0.18-inch (4.57 mm) roll formed steel. Track shall be supported by adjustable steel hanger brackets connected to structural support pairs of 1/2-inch (13 mm) diameter threaded rods. Brackets must support the load bearing surface of the track.
 - a. Exposed track soffit: Steel, removable for service and maintenance, attached to track bracket without exposed fasteners, and pre-painted off-white.
2. Carriers: Two all-steel trolleys with steel-tired ball bearing wheels. Non-steel tires are not acceptable. Suspension system shall provide automatic indexing of panels into stack area using preprogrammed switches and trolleys without electrical, pneumatic, or mechanical activation.
3. Warranty period: Twenty (20) years.

- OR -

C. RT100 Suspension System – Multi-Directional

1. Suspension Tracks: Precision heat-treated extruded aluminum. Track to be supported by pairs of 3/8-inch (9.5 mm) diameter threaded rods.
 - a. Exposed track soffit: Track soffit to be integral to track shape and shall be powder-coated off-white paint finish. Track must accommodate termination of plenum sound barriers on both sides of track for maximum sound control.
2. Carriers: Shall have horizontal counter-rotating wheels with heavy duty steel thrust bearings. Carriers permit panels to traverse L, T, or X intersections without mechanical switching.
3. Warranty period: Two (2) years.

- OR -

D.RT200 Suspension System – Multi-Directional

1. Suspension Tracks: Precision heat-treated extruded aluminum. Track to be supported by pairs of 3/8-inch (9.5 mm) diameter threaded rods.
 - a. Exposed track soffit: Track soffit to be integral to track shape and shall be powder-coated off-white paint finish. Track must accommodate termination of plenum sound barriers on both sides of track for maximum sound control.
2. Carriers: Shall have horizontal counter-rotating wheels with oversized, steel reinforced, heavy duty steel thrust bearings. Carriers permit panels to traverse L, T, or X intersections without mechanical switching.
3. Warranty period: Two (2) years.

- OR -

E. Modernfold Truss System: Prefabricated, self-supporting header system for the support of operable partitions. (For complete specification see Modernfold Truss System brochure Form #2600)

2.7 OPTIONS

A. Single Pass Doors:

1. Matching pass door same thickness and appearance as the panels. ADA compliant pass door to be trimless and equipped with friction latch and flush pulls for panic operation. No threshold will be permitted.

2. Hardware:

- a. Hand pull with push plate.
- b. Lever handles both sides of door
- c. Panic hardware with or without locking lever handle.
- d. Automatic door closer.
- e. Door viewer.
- f. Self-Illuminated exit signs:
 - i. Chemical exit sign – recess mount
 - ii. Chemical exit sign – surface mount
 - iii. Photo luminescent exit sign – surface mount

B. Double Pass Doors:

1. Matching pass door same thickness and appearance as the panels. No center post is permitted. Active leaf to be trimless and equipped for panic operation. No threshold will be permitted.

2. Hardware:

- a. Hand pull with push plate.
- b. Lever handles both sides of door
- c. Panic hardware with or without locking lever handle.
- d. Automatic door closer.
- e. Self-Illuminated exit signs:
 - i. Chemical exit sign – recess mount
 - ii. Chemical exit sign – surface mount
 - iii. Photo luminescent exit sign – surface mount

C. Work Surfaces:

1. Markerboard: White enamel on steel, bonded to the face of the panel with horizontal trim without exposed fasteners. Trim is not acceptable on vertical edges to provide uninterrupted work surface.
2. Tackboard: Minimum 1/4-inch (6.35 mm) natural cork, covered with vinyl or fabric, with horizontal trim without exposed fasteners. Trim is not acceptable on vertical edges.

D. Available Accessories/Options:

1. Pocket Doors: Acousti-Seal Pocket Doors by Modernfold, Inc., with same finish and appearance as the adjacent panels.
2. Intersecting partition interface.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General: Comply with ASTM E557, operable partition manufacturer's written installation instructions, Drawings and approved Shop Drawings.

- B. Install operable partitions and accessories after other finishing operations, including painting have been completed.
- C. Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.
- D. Broken, cracked, chipped, deformed or unmatched panels are not acceptable.

3.2 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 ensure operable partitions are without damage or deterioration at time of Substantial Completion.

3.3 ADJUSTING

- A. Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.4 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 DEMONSTRATION

- A. Demonstrate proper operation and maintenance procedures to Owner's representative.
- B. Provide Operation and Maintenance Manual to Owner's representative.

Modernfold, Inc.
215 West New Road
Greenfield, IN 46140
Toll Free: 800.869.9685
email: info@modernfold.com
www.modernfold.com

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 end splashes.
 - 3. Quartz agglomerate apron fronts.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
 - 1. Show locations and details of joints.
 - 2. Show direction of directional pattern, if any.
- C. Samples for Initial Selection: For each type of material exposed to view.

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.

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, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. As indicated.
 - 2. Colors and Patterns: As selected by Designer from manufacturer's full range.
- B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WT's "Architectural Woodwork Standards."
 - 1. Grade: Premium.
- B. Countertops: 3/4-inch- (19-mm-) thick, quartz agglomerate, unless otherwise indicated.
- C. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
- D. Joints: Fabricate countertops in sections for joining in field, with joints at locations indicated.
 - 1. Joint Locations: Not within 18 inches (450 mm) of a sink or trash receptacle opening and not where a countertop section less than 36 inches (900 mm) 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. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.

E. 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, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch (5 mm) into fixture opening.
2. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by quartz agglomerate manufacturer.

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.

3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m), maximum. Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. 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.
- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. 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.

- E. 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 indicated. 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.
- F. 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.
- G. 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. Predrill holes for screws as recommended by manufacturer.
- H. 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.
 - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.19