

#### **VOLUME I**

PROJECT MANUAL

Testing and Inspection / Commissioning Proposals





BCSD – FEMA HMGP PHASE II SAFE ROOM

**CONTRACT #: BCSD-SAFE ROOM 03** 

BARNWELL COUNTY SCHOOL DISTRICT

474 Jackson St. Barnwell, South Carolina

200-207015-20004

**DECEMBER 17, 2024** 

PROJECT NAME: FEMA HMGP Phase II Safe Room – Testing & Commissioning

PROJECT NUMBER: BCSD - SAFE ROOM 03

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# South Carolina Division of Procurement Services, Office of State Engineer Version of MAIA Document A701™ – 2018

Instructions to Bidders

This version of AIA Document A701™–2018 is modified by the South Carolina Division of Procurement Services, Office of State Engineer ("SCOSE"). Publication of this version of AIA Document A701–2018 does not imply the American Institute of Architects' endorsement of any modification by SCOSE. A comparative version of AIA Document A701–2018 showing additions and deletions by SCOSE is available for review on the SCOSE Web site.

Cite this document as "AIA Document A701™— 2018, Instructions to Bidders — SCOSE Version," or "AIA Document A701™—2018 — SCOSE Version."

# South Carolina Division of Procurement Services, Office of State Engineer Version of AIA Document A701 $^{\text{TM}}$ – 2018

#### Instructions to Bidders

for the following Project:
(Name, State Project Number, location, and detailed description)
Barnwell District 45 Safe Room
4286-F52-S118
474 Jackson Street
Barnwell, SC 29812

#### THE OWNER:

(Name, legal status, address, and other information)
Barnwell School District 45
770 Hagood Ave
Barnwell, SC 29812

The Owner is a Governmental Body of the State of South Carolina as defined by S.C. Code Ann. § 11-35-310.

#### THE ARCHITECT:

(Name, legal status, address, and other information)
Tetra Tech, Inc
2301 Lucien Way Suite 120
Maitland, FA 32751

This version of AIA Document A701-2018 is modified by the South Carolina Division of Procurement Services, Office of State Engineer. Publication of this version of AIA Document A701 does not imply the American Institute of Architects' endorsement of any modification by South Carolina Division of Procurement Services, Office of State Engineer. A comparative version of AIA Document A701-2018 showing additions and deletions by the South Carolina Division of Procurement Services, Office of State Engineer is available for review on South Carolina state Web site.

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

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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.
- § 1.1.1 Any reference in this document to the Agreement between the Owner and Contractor, AIA Document A101, or some abbreviated reference thereof, shall mean the AIA Document A101-2017 Standard Form of Agreement Between Owner and Contractor, SCOSE Version. Any reference in this document to the General Conditions of the Contract for Construction, AIA Document A201, or some abbreviated reference thereof, shall mean the AIA Document A201-2017 General Conditions of the Contract for Construction, SCOSE Version.
- § 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.
- § 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, has correlated the Bidder's observations with the requirements of the Proposed Contract Documents, and accepts full responsibility for any pre-bid existing conditions that would affect the Bid that could have been ascertained by a site visit. As provided in S.C. Code Ann. Reg. 19-445.2042(B), a bidder's failure to attend an advertised pre-bid conference will not excuse its responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the State;
  - .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception:
  - .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; and
  - .7 the Bidder understands that it may be required to accept payment by electronic funds transfer (EFT).

#### § 2.2 Certification of Independent Price Determination

§ 2.2.1 GIVING FALSE, MISLEADING, OR INCOMPLETE INFORMATION ON THIS CERTIFICATION MAY RENDER YOU SUBJECT TO PROSECUTION UNDER SC CODE OF LAWS §16-9-10 AND OTHER APPLICABLE LAWS.

#### § 2.2.2 By submitting a Bid, the Bidder certifies that:

- .1 The prices in this Bid have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other bidder or competitor relating to:
  - .1 those prices;
  - .2 the intention to submit a Bid; or
  - .3 the methods or factors used to calculate the prices offered.
- .2 The prices in this Bid have not been and will not be knowingly disclosed by the Bidder, directly or indirectly, to any other bidder or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and
- .3 No attempt has been made or will be made by the Bidder to induce any other concern to submit or not to submit a Bid for the purpose of restricting competition.
- § 2.2.3 Each signature on the Bid is considered to be a certification by the signatory that the signatory:
  - .1 Is the person in the Bidder's organization responsible for determining the prices being offered in this Bid, and that the signatory has not participated and will not participate in any action contrary to Section 2.2.2 of this certification; or
  - .2 Has been authorized, in writing, to act as agent for the Bidder's principals in certifying that those principals have not participated, and will not participate in any action contrary to Section 2.2.2 of this certification [As used in this subdivision, the term "principals" means the person(s) in the Bidder's organization responsible for determining the prices offered in this Bid];
  - .3 As an authorized agent, does certify that the principals referenced in Section 2.2.3.2 of this certification have not participated, and will not participate, in any action contrary to Section 2.2.2 of this certification; and
  - .4 As an agent, has not personally participated, and will not participate, in any action contrary to Section 2.2.2 of this certification.
- § 2.2.4 If the Bidder deletes or modifies Section 2.2.2.2 of this certification, the Bidder must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

#### § 2.2.5 Drug Free Workplace Certification

By submitting a Bid, the Bidder certifies that, if awarded a contract, Bidder will comply with all applicable provisions of The Drug-free Workplace Act, S.C. Code Ann. 44-107-10, et seq.

#### § 2.2.6 Certification Regarding Debarment and Other Responsibility Matters

- § 2.2.6.1 By submitting a Bid, Bidder certifies, to the best of its knowledge and belief, that:
  - .1 Bidder and/or any of its Principals-
    - .1 Are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any state or federal agency;
    - .2 Have not, within a three-year period preceding this Bid, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of bids; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and
    - .3 Are not presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in Section 2.2.6.1.1.2 of this provision.
  - .2 Bidder has not, within a three-year period preceding this Bid, had one or more contracts terminated for default by any public (Federal, state, or local) entity.
  - "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).
- § 2.2.6.2 Bidder shall provide immediate written notice to the Procurement Officer if, at any time prior to contract award, Bidder learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

- § 2.2.6.3 If Bidder is unable to certify the representations stated in Section 2.2.6.1, Bidder must submit a written explanation regarding its inability to make the certification. The certification will be considered in connection with a review of the Bidder's responsibility. Failure of the Bidder to furnish additional information as requested by the Procurement Officer may render the Bidder non-responsible.
- § 2.2.6.4 Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by Section 2.2.6.1 of this provision. The knowledge and information of a Bidder is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- § 2.2.6.5 The certification in Section 2.2.6.1 of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Bidder knowingly or in bad faith rendered an erroneous certification, in addition to other remedies available to the State, the Procurement Officer may terminate the contract resulting from this solicitation for default.

#### § 2.2.7 Ethics Certificate

By submitting a Bid, the Bidder certifies that the Bidder has and will comply with, and has not, and will not, induce a person to violate Title 8, Chapter 13 of the SC Code of Laws, as amended (Ethics Act). The following statutes require special attention: S.C. Code Ann. §8-13-700, regarding use of official position for financial gain; S.C. Code Ann. §8-13-705, regarding gifts to influence action of public official; S.C. Code Ann. §8-13-720, regarding offering money for advice or assistance of public official; S.C. Code Ann. §8-13-755 and §8-13-760, regarding restrictions on employment by former public official; S.C. Code Ann. §8-13-775, prohibiting public official with economic interests from acting on contracts; S.C. Code Ann. §8-13-790, regarding recovery of kickbacks; S.C. Code Ann. §8-13-1150, regarding statements to be filed by consultants; and S.C. Code Ann. §8-13-1342, regarding restrictions on contributions by contractor to candidate who participated in awarding of contract. The State may rescind any contract and recover all amounts expended as a result of any action taken in violation of this provision. If the contractor participates, directly or indirectly, in the evaluation or award of public contracts, including without limitation, change orders or task orders regarding a public contract, the contractor shall, if required by law to file such a statement, provide the statement required by S.C. Code Ann. §8-13-1150 to the Procurement Officer at the same time the law requires the statement to be filed.

#### § 2.2.8 Restrictions Applicable To Bidders & Gifts

Violation of these restrictions may result in disqualification of your Bid, suspension or debarment, and may constitute a violation of the state Ethics Act.

- § 2.2.8.1 After issuance of the solicitation, Bidder agrees not to discuss this procurement activity in any way with the Owner or its employees, agents or officials. All communications must be solely with the Procurement Officer. This restriction may be lifted by express written permission from the Procurement Officer. This restriction expires once a contract has been formed.
- § 2.2.8.2 Unless otherwise approved in writing by the Procurement Officer, Bidder agrees not to give anything to the Owner, any affiliated organizations, or the employees, agents or officials of either, prior to award.
- § 2.2.8.3 Bidder acknowledges that the policy of the State is that a governmental body should not accept or solicit a gift, directly or indirectly, from a donor if the governmental body has reason to believe the donor has or is seeking to obtain contractual or other business or financial relationships with the governmental body. SC Regulation 19-445.2165(C) broadly defines the term donor.

#### § 2.2.9 Open Trade Representation

By submitting a Bid, the Bidder represents that Bidder is not currently engaged in the boycott of a person or an entity based in or doing business with a jurisdiction with whom South Carolina can enjoy open trade, as defined in S.C. Code Ann. §11-35-5300.

#### ARTICLE 3 BIDDING DOCUMENTS

#### § 3.1 Distribution

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

§ 3.1.2 Any required deposit shall be refunded to all plan holders who return the paper Bidding Documents in good condition within ten (10) 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 Reserved

- § 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.
- § 3.1.6 All persons obtaining Bidding Documents from the issuing office designated in the advertisement shall provide that office with Bidder's contact information to include the Bidder's name, telephone number, mailing address, and email address.

#### § 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. Failure to do so will be at the Bidder's risk. Bidder assumes responsibility for any patent ambiguity that Bidder does not bring to the Architect's attention prior to Bid Opening.
- § 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 ten (10) days prior to the date for receipt of Bids.
- § 3.2.3 Modifications, corrections, changes, and interpretations of the Bidding Documents shall be made by Addendum. Modifications, corrections, changes, and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.
- § 3.2.4 As provided in S.C. Code Ann. Reg. 19-445.2042(B), nothing stated at the Pre-bid conference shall change the Bidding Documents unless a change is made by Addendum.

#### § 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. Where "brand name or equal" is used in the Bidding Documents, the listing description is not intended to limit or restrict competition.

#### § 3.3.2 Substitution Process

- § 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten (10) 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.
- § 3.3.2.4 No request to substitute materials, products, or equipment for materials, products, or equipment described in the Bidding Documents and no request for addition of a manufacturer or supplier to a list of approved manufacturers or suppliers in the Bidding Documents will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten (10) days prior to the date for receipt of Bids established in the invitation to bid.

Any subsequent extension of the date for receipt of Bids by addendum shall not extend the date for receipt of such requests unless the addendum so specifies. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the Work of other contracts that incorporation of the proposed substitution would require, shall be included.

- § 3.3.3 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.
- § 3.4.2 Addenda will be available where Bidding Documents are on file.
- § 3.4.3 Addenda will be issued at least five (5) business days before the day of the Bid Opening, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids. A business day runs from midnight to midnight and excludes weekends and state and federal holidays.
- § 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.
- § 3.4.5 When the date for receipt of Bids is to be postponed and there is insufficient time to issue an Addendum prior to the original Bid Date, the Owner will notify prospective Bidders by telephone or other appropriate means with immediate follow up with an Addendum. This Addendum will verify the postponement of the original Bid Date and establish a new Bid Date. The new Bid Date will be no earlier than the fifth (5th) business day after the date of issuance of the Addendum postponing the original Bid Date.
- § 3.4.6 If an emergency or unanticipated event interrupts normal government processes so that Bids cannot be received at the government office designated for receipt of Bids by the exact time specified in the solicitation, the time specified for receipt of Bids will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal government processes resume. In lieu of an automatic extension, an Addendum may be issued to reschedule Bid Opening. If state offices are closed in the county in which Bids are to be received at the time a pre-bid or pre-proposal conference is scheduled, an Addendum will be issued to reschedule the conference. Bidders shall visit <a href="https://www.scemd.org/closings/">https://www.scemd.org/closings/</a> for information concerning closings.

#### 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 numbers.
- § 4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid. Bidder shall not make stipulations or qualify his Bid in any manner not permitted on the Bid Form. An incomplete Bid or information not requested that is written on or attached to the Bid Form that could be considered a qualification of the Bid, may be cause for rejection of the Bid.
- § 4.1.5 All requested Alternates shall be bid. The failure of the Bidder to indicate a price for an Alternate shall render the Bid non-responsive. Indicate the change to the Base Bid by entering the dollar amount and marking, as appropriate, the box for "ADD TO" or "DEDUCT FROM". If no change in the Base Bid is required, enter "ZERO" or "No Change".

- § 4.1.6 Pursuant to S.C. Code Ann. § 11-35-3020(b)(i), as amended, Section 7 of the Bid Form sets forth a list of proposed subcontractors for which the Bidder is required to identify those subcontractors the Bidder will use to perform the work listed. Bidder must follow the instructions in the Bid Form for filling out this section of the Bid Form. Failure to properly fill out Section 7 may result in rejection of Bidder's bid as non-responsive.
- § 4.1.7 Contractors and subcontractors listed in Section 7 of the Bid Form who are required by the South Carolina Code of Laws to be licensed, must be licensed as required by law at the time of bidding.
- § 4.1.8 Each copy of the Bid shall state the legal name and legal status of the Bidder. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract.
- § 4.1.9 A Bidder shall incur all costs associated with the preparation of its Bid.

#### § 4.2 Bid Security

- § 4.2.1 If required by the invitation to bid, each Bid shall be accompanied by a bid security in an amount of not less than five percent of the Base Bid. The bid security shall be a bid bond or a certified cashier's check.
- § 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.
- § 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310<sup>™</sup>, Bid Bond and 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 Bid Bond shall:
  - .1 be issued by a surety company licensed to do business in South Carolina;
  - .2 be issued by a surety company having, at a minimum, a "Best Rating" of "A" as stated in the most current publication of "Best's Key Rating Guide, Property-Casualty", which company shows a financial strength rating of at least five (5) times the contract price.
  - .3 be enclosed in the bid envelope at the time of Bid Opening, either in paper copy or as an electronic bid bond authorization number provided on the Bid Form and issued by a firm or organization authorized by the surety to receive, authenticate and issue binding electronic bid bonds on behalf the surety.
- § 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and performance and payment 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.
- § 4.2.5 By submitting a Bid Bond via an electronic bid bond authorization number on the Bid Form and signing the Bid Form, the Bidder certifies that an electronic bid bond has been executed by a Surety meeting the standards required by the Bidding Documents and the Bidder and Surety are firmly bound unto the State of South Carolina under the conditions provided in this Section 4.2.

#### § 4.3 Submission of Bids

- § 4.3.1 A Bidder shall submit its Bid as indicated below:
- § 4.3.2 All 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, unless hand delivered by the Bidder, be addressed to the Owner's designated purchasing office as shown in the invitation to bid. The envelope 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, or special delivery service (UPS, Federal Express, etc.), the sealed envelope shall be labelled "SEALED BID ENCLOSED" on the face thereof. Bidders hand delivering their Bids shall deliver Bids to the place of the Bid Opening as shown in the invitation for bids. Whether or not Bidders attend the Bid Opening, they shall give their Bids to the Owner's Procurement Officer or his/her designee as shown in the invitation to bid prior to the time of the Bid Opening.
- § 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. Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.
- § 4.3.6 The official time for receipt of Bids will be determined by reference to the clock designated by the Owner's Procurement Officer or his/her designee. The Procurement Officer conducting the Bid Opening will determine and announce that the deadline has arrived and no further Bids or bid modifications will be accepted. All Bids and bid modifications in the possession of the Procurement Officer at the time the announcement is completed will be timely, whether or not the bid envelope has been date/time stamped or otherwise marked by the Procurement Officer.

#### § 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.

#### ARTICLE 5 CONSIDERATION OF BIDS

#### § 5.1 Opening of Bids

Bids received on time will be publicly opened and read aloud. The Owner will not read aloud Bids that the Owner determines, at the time of opening, to be non-responsive.

- § 5.1.1 At Bid Opening, the Owner will announce the date and location of the posting of the Notice of Intend to Award. If the Owner determines to award the Project, the Owner will, after posting a Notice of Intend to Award, send a copy of the Notice to all Bidders.
- § 5.1.2 The Owner will send a copy of the final Bid Tabulation to all Bidders within ten (10) working days of the Bid Opening.
- § 5.1.3 If only one Bid is received, the Owner will open and consider the Bid.

#### § 5.2 Rejection of Bids

- § 5.2.1 The Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.
- § 5.2.2 The reasons for which the Owner will reject Bids include, but are not limited to:
  - .1 Failure by a Bidder to be represented at a Mandatory Pre-Bid Conference or site visit;
  - .2 Failure to deliver the Bid on time;
  - .3 Failure to comply with Bid Security requirements, except as expressly allowed by law;
  - .4 Listing an invalid electronic Bid Bond authorization number on the Bid Form;
  - .5 Failure to Bid an Alternate, except as expressly allowed by law;
  - .6 Failure to list qualified subcontractors as required by law;
  - .7 Showing any material modification(s) or exception(s) qualifying the Bid;
  - .8 Faxing a Bid directly to the Owner or Owner's representative; or
  - .9 Failure to include a properly executed Power-of-Attorney with the Bid Bond.
- § 5.2.3 The Owner may reject a Bid as nonresponsive if the prices bid are materially unbalanced between line items or sub-line items. A Bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated in relation to cost for other work, and if there is a reasonable doubt that the Bid

will result in the lowest overall cost to the Owner even though it may be the low evaluated Bid, or if it is so unbalanced as to be tantamount to allowing an advance payment.

#### § 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 and does not exceed available funds. 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 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 Responsibility

Owner will make a determination of Bidder's responsibility before awarding a contract. Bidder shall provide all information and documentation requested by the Owner to support the Owner's evaluation of responsibility. Failure of Bidder to provide requested information is cause for the Owner, at its option, to determine the Bidder to be non-responsible.

#### § 6.2 Reserved

#### § 6.3 Submittals

- § 6.3.1 After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:
  - .1 a designation of the Work to be performed with the Bidder's own forces;
  - .2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each: and
  - .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

#### § 6.4 Posting of Intent To Award

The Notice of Intent to Award will be posted at the following location:

Room or Area of Posting: Superintendent's Office and CFO Office

**Building Where Posted:** Barnwell District Office

Address of Building: 770 Hagood Ave, Barnwell, SC 29812

WEB site address (if applicable): www.bcsd.net

**Posting date will be announced at Bid Opening.** In addition to posting the Notice, the Owner will promptly send all responsive Bidders a copy of the Notice of Intent to Award and the final bid tabulation

#### § 6.5 Protest of Solicitation or Award

- § 6.5.1 If you are aggrieved in connection with the solicitation or award of a contract, you may be entitled to protest, but only as provided in S.C. Code Ann. § 11-35-4210. To protest a solicitation, you must submit a protest within fifteen (15) days of the date the applicable solicitation document is issued. To protest an award, you must (i) submit notice if your intent to protest within seven (7) business days of the date the award notice is posted, and (ii) submit your actual protest within fifteen (15) days of the date the award notice is posted. Days are calculated as provided in Section 11-35-310(13). Both protests and notices of intent to protest must be in writing and must be received by the State Engineer within the time provided. The grounds of the protest and the relief requested must be set forth with enough particularity to give notice of the issues to be decided.
- § 6.5.2 Any protest must be addressed to the CPO, Office of State Engineer, and submitted in writing:
  - .1 by email to protest-ose@mmo.sc.gov,
  - .2 by facsimile at 803-737-0639, or
  - .3 by post or delivery to 1201 Main Street, Suite 600, Columbia, SC 29201.

By submitting a protest to the foregoing email address, you (and any person acting on your behalf) consent to receive communications regarding your protest (and any related protests) at the e-mail address from which you sent your protest.

- § 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid.
- § 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the state of South Carolina.
- § 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of 100% of the Contract Sum.

#### § 7.2 Time of Delivery of Contract, Certificates of Insurance, and Form of Bonds

- § 7.2.1 Following expiration of the protest period, the Owner will forward the Contract for Construction to the Bidder for signature. The Bidder shall return the fully executed Contract for Construction to the Owner within seven (7) days. The Bidder shall deliver the required bonds and certificate of insurance to the Owner not later than three (3) days following the date of execution of the Contract. Failure to deliver these documents as required shall entitle the Owner to consider the Bidder's failure as a refusal to enter into a contract in accordance with the terms and conditions of the Bidder's Bid and to make claim on the Bid Security for re-procurement cost.
- § 7.2.2 Unless otherwise provided, the bonds shall be written on the Performance Bond and Payment Bond forms included in the Bid Documents.
- § 7.2.3 The bonds shall be dated on or after the date of the Contract.

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§ 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, SCOSE Version.
  - .2 AIA Document A101<sup>TM</sup>\_2017, Exhibit A, Insurance and Bonds, SCOSE Version.
  - .3 AIA Document A201<sup>TM</sup>—2017, General Conditions of the Contract for Construction, SCOSE Version.
  - .4 AIA Document E203<sup>TM</sup>\_2013, Building Information Modeling and Digital Data Exhibit

.5	Drawings					
	Number	Title	Date			
.6	Specifications					
	Section	Title	Date	Pages		

.7	Addend	da:		
	Number	•	Date	Pages
.8		Exhibits:  all boxes that apply and included AIA Document E204 <sup>TM</sup> _2017		dentifying the exhibit where required.) it, dated as indicated below:
		The Sustainability Plan:		
		Supplementary and other Con	ditions of the Contract:	

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

#### ARTICLE 9 Miscellaneous

.9

Other documents listed below:

- Income Tax Withholding, Form I-312 to the person letting the contract.

§ 9.1 Nonresident Taxpayer Registration Affidavit Income Tax Withholding Important Tax Notice - Nonresidents Only § 9.1.1 Withholding Requirements for Payments to Nonresidents: SC Code of Laws §12-8-550 requires persons hiring or contracting with a nonresident conducting a business or performing personal services of a temporary nature within South Carolina to withhold 2% of each payment made to the nonresident. The withholding requirement does not apply to (1) payments on purchase orders for tangible personal property when the payments are not accompanied by services to be performed in South Carolina, (2) nonresidents who are not conducting business in South Carolina, (3) nonresidents for contracts that do not exceed \$10,000 in a calendar year, or (4) payments to a nonresident who (a) registers with either the S.C. Department of Revenue or the S.C. Secretary of State and (b) submits a Nonresident Taxpayer Registration Affidavit

- § 9.1.2 For information about other withholding requirements (e.g., employee withholding), contact the Withholding Section at the South Carolina Department of Revenue at 803-898-5383 or visit the Department's website at: <a href="https://www.sctax.org">www.sctax.org</a>
- § 9.1.3 This notice is for informational purposes only. This Owner does not administer and has no authority over tax issues. All registration questions should be directed to the License and Registration Section at 803-898-5872 or to the South Carolina Department of Revenue, Registration Unit, Columbia, S.C. 29214-0140. All withholding questions should be directed to the Withholding Section at 803-898-5383.

PLEASE SEE THE "NONRESIDENT TAXPAYER REGISTRATION AFFIDAVIT INCOME TAX WITHHOLDING" FORM (Available through SC Department of Revenue).

#### § 9.2 Submitting Confidential Information

§ 9.2.1 For every document the Bidder submits in response to or with regard to this solicitation or request, the Bidder must separately mark with the word "CONFIDENTIAL" every page, or portion thereof, that the Bidder contends contains

information that is exempt from public disclosure because it is either (a) a trade secret as defined in Section 30-4-40(a)(1), or (b) privileged & confidential, as that phrase is used in SC Code of Laws §11-35-410.

- § 9.2.2 For every document the Bidder submits in response to or with regard to this solicitation or request, the Bidder must separately mark with the words "TRADE SECRET" every page, or portion thereof, that the Bidder contends contains a trade secret as that term is defined by SC Code of Laws §39-8-20.
- § 9.2.3 For every document the Bidder submits in response to or with regard to this solicitation or request, the Bidder must separately mark with the word "PROTECTED" every page, or portion thereof, that the Bidder contends is protected by SC Code of Laws §11-35-1810.
- § 9.2.4 All markings must be conspicuous; use color, bold, underlining, or some other method in order to conspicuously distinguish the mark from the other text. Do not mark your entire Bid as confidential, trade secret, or protected! If your Bid, or any part thereof, is improperly marked as confidential or trade secret or protected, the State may, in its sole discretion, determine it nonresponsive. If only portions of a page are subject to some protection, do not mark the entire page.
- § 9.2.5 By submitting a response to this solicitation, Bidder (1) agrees to the public disclosure of every page of every document regarding this solicitation or request that was submitted at any time prior to entering into a contract (including, but not limited to, documents contained in a response, documents submitted to clarify a response, & documents submitted during negotiations), unless the page is conspicuously marked "TRADE SECRET" or "CONFIDENTIAL" or "PROTECTED", (2) agrees that any information not marked, as required by these bidding instructions, as a "Trade Secret" is not a trade secret as defined by the Trade Secrets Act, & (3) agrees that, notwithstanding any claims or markings otherwise, any prices, commissions, discounts, or other financial figures used to determine the award, as well as the final contract amount, are subject to public disclosure.
- § 9.2.6 In determining whether to release documents, the State will detrimentally rely on the Bidders' marking of documents, as required by these bidding instructions, as being either "Confidential" or "Trade Secret" or "PROTECTED".
- § 9.2.7 By submitting a response, the Bidder agrees to defend, indemnify & hold harmless the State of South Carolina, its officers & employees, from every claim, demand, loss, expense, cost, damage or injury, including attorney's fees, arising out of or resulting from the State withholding information that Bidder marked as "confidential" or "trade secret" or "PROTECTED".

#### § 9.3 Solicitation Information From Sources Other Than Official Source

South Carolina Business Opportunities (SCBO) is the official state government publication for State of South Carolina solicitations. Any information on State agency solicitations obtained from any other source is unofficial and any reliance placed on such information is at the Bidder's sole risk and is without recourse under the South Carolina Consolidated Procurement Code.

#### § 9.4 Builder's Risk Insurance

Bidders are directed to Exhibit A of the AIA Document A101, 2017 SCOSE Version, which, unless provided otherwise in the Bid Documents, requires the contractor to provide builder's risk insurance on the project.

#### § 9.5 Tax Credit For Subcontracting With Minority Firms

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- § 9.5.1 Pursuant to S.C. Code Ann. §12-6-3350, taxpayers, who utilize certified minority subcontractors, may take a tax credit equal to 4% of the payments they make to said subcontractors. The payments claimed must be based on work performed directly for a South Carolina state contract. The credit is limited to a maximum of fifty thousand dollars annually. The taxpayer is eligible to claim the credit for 10 consecutive taxable years beginning with the taxable year in which the first payment is made to the subcontractor that qualifies for the credit. After the above ten consecutive taxable years, the taxpayer is no longer eligible for the credit. The credit may be claimed on Form TC-2, "Minority Business Credit." A copy of the subcontractor's certificate from the Governor's Office of Small and Minority Business (OSMBA) is to be attached to the contractor's income tax return.
- § 9.5.2 Taxpayers must maintain evidence of work performed for a State contract by the minority subcontractor. Questions regarding the tax credit and how to file are to be referred to: SC Department of Revenue, Research and Review, Phone: (803) 898-5786, Fax: (803) 898-5888.

§ 9.5.3 The subcontractor must be certified as to the criteria of a "Minority Firm" by the Governor's Office of Small and Minority Business Assistance (OSMBA). Certificates are issued to subcontractors upon successful completion of the certification process. Questions regarding subcontractor certification are to be referred to: Governor's Office of Small and Minority Business Assistance, Phone: (803) 734-0657, Fax: (803) 734-2498. Reference: S.C. Code Ann. §11-35-5010 – Definition for Minority Subcontractor & S.C. Code Ann. §11-35-5230 (B) – Regulations for Negotiating with State Minority Firms.

§ 9.6 Other Special Conditions Of The Work

# **SE-310**

# INVITATION FOR DESIGN-BID-BUILD CONSTRUCTION SERVICES

AGENCY/OWNER: Barnwell County School District		
PROJECT NAME: BCSD FEMA HMGP Phase II Safe Re	oom	
PROJECT NUMBER: BCSD-SAFE ROOM 03		CONSTRUCTION
COST RANGE: \$ NA		to \$ <u>NA</u>
PROJECT LOCATION: 474 Jackson St, Barnwell, SC 29	9812	
<b>DESCRIPTION OF PROJECT/SERVICES:</b> The service building will be used as a Hurricane Shelter. This project wi building will be used to host sporting & different types of every specific project.	ll also consists of a new Multi-use	
		MBER OF COPIES: 1
PROJECT DELIVERY METHOD: Design-Bid-Build	*	
AGENCY PROJECT COORDINATOR: Crystal Stapleto	on	
EMAIL: cstapleton@bcsd.net		E: 803-541-1300
DOCUMENTS MAY BE OBTAINED FROM: Holly Hu		
2 0 001.121.112 1.111.122 1.1101.1 <u>.1101.1</u>	<del>oro, marco (g/o esamer</del>	
BID SECURITY IS REQUIRED IN AN AMOUNT NOT	LESS THAN 5% OF THE BA	SE BID.
PERFORMANCE AND LABOR & MATERIAL PAYM		
Performance and Labor and Material Payment Bonds, each i		1 1
DOCUMENT DEPOSIT AMOUNT: \$ 0	IS DEPOSIT REFUNDABLI	E Yes No No N/A
Bidders must obtain Bidding Documents/Plans from the above listed source		
any other source do so at their own risk. All written communications with	official plan holders & bidders will be via	email or website posting.
Agency WILL NOT accept Bids sent via email.		
All questions & correspondence concerning this Invitation shall be address	ed to the A/E	
A/E NAME: Tetra Tech	A/E CONTACT: Li	nda D'Isabella
EMAIL: linda.disabella@tetratech.com		Z: (302) 283-2273
PRE-BID CONFERENCE: Yes ☐ No ☒	MANDATORY ATTE	NDANCE: Yes \( \subseteq \text{No } \text{No } \ext{\text{No }} \text
PRE-BID DATE: NA	TIME: 2:00pm	TO THE TO S
PRE-BID PLACE: NA	110112. 2.00pm	
BID OPENING PLACE: Barnwell County District Office		
BID DELIVERY ADDRESSES:		
	MAIL CEDVICE.	
HAND-DELIVERY:	MAIL SERVICE:	
Attn: Holly Hutto 770 Hagood Ave.	Attn: Holly Hutto 770 Hagood Ave	
Barnwell, SC 29812	Barnwell, SC 29812	
Barriwell, SC 29812	Barnwen, SC 29812	
IS PROJECT WITHIN AGENCY CONSTRUCTION CERTIF	FICATION? (Agency MUST check of	one) Yes 🗌 No 🗌
APPROVED BY:	D	ATE:
(OSE Project Manager)		

Bidders shall submit bids on only Bid Form SE-330.

BID	SUBMITTED BY:					
			(Bi	idder's Name)		
BID	SUBMITTED TO:					
			(Ag	gency's Name)		
FOR	R: PROJECT NA	AME: Barnwel	ll County Scho	ol District - FE	MA HMGP Ph	ase II Safe Room
	PROJECT NI	UMBER: BCS	D - Safe Room	n 05 Commissio	ning	
<u>OFF</u>	ER					
§ 1.	named Project, the und Agency on the terms in	dersigned Bidder peluded in the Bidd ces and within the	proposes and agre ing Documents, a	ees, if this Bid is nd to perform all V	accepted, to enter Vork as specified o	to Bidders for the above- into a Contract with the r indicated in the Bidding with the other terms and
§ 2.	Pursuant to SC Code § Documents.	11-35-3030(1), Bi	dder has submitte	d Bid Security in tl	ne amount and forr	m required by the Bidding
§ 3.	said Addenda into this (Bidder, check all that ap	Bid:  ply. Note, there may	v be more boxes that	n actual addenda. D	o not check boxes th	_
	ADDENDA:	<b>∐</b> #1	□ #2	□ #3	<b>□</b> # <b>4</b>	□ #5
§ 4.	disposition of Bid Sec	urity. Bidder agr ening of bids, and	ees that this Bid, shall remain oper	including all Bid n for acceptance for	Alternates, if any or a period of <u>60</u>	on, those dealing with the r, may not be revoked or Days following the Bid Agency.
§ 5.		ees, and to pay all				accessories, appliances, necessary to complete the
§ 6.1	BASE BID WORK (a.	s indicated in the Bi	dding Documents a	and generally descri	bed as follows): <u>Co</u>	ommissioning
	\$ (Bidder to insert Base	Bid Amount on line		, which sum	is hereafter called	the Base Bid.

BF – 1 SE-330

Bidders shall submit bids on only Bid Form SE-330.

§ 6.2 BID ALTERNATES as indicated in the Bidding Documents and generally described as follows:

ALTERNATE # 1 (Brief Description): NA
☐ ADD TO or ☐ DEDUCT FROM BASE BID: \$
(Bidder to mark appropriate box to clearly indicate the price adjustment offered for each Alternate)
ALTERNATE # 2 (Brief Description):
☐ ADD TO or ☐ DEDUCT FROM BASE BID: \$
(Bidder to mark appropriate box to clearly indicate the price adjustment offered for each Alternate)
ALTERNATE # 3 (Brief Description):
☐ ADD TO or ☐ DEDUCT FROM BASE BID: \$
(Bidder to mark appropriate box to clearly indicate the price adjustment offered for each Alternate)

#### § 6.3 UNIT PRICES:

BIDDER offers for the Agency's consideration and use, the following UNIT PRICES. The UNIT PRICES offered by BIDDER indicate the amount to be added to or deducted from the CONTRACT SUM for each item-unit combination. UNIT PRICES include all costs to the Agency, including those for materials, labor, equipment, tools of trades and labor, fees, taxes, insurance, bonding, overhead, profit, etc. The Agency reserves the right to include or not to include any of the following UNIT PRICES in the Contract and to negotiate the UNIT PRICES with BIDDER prior to including in the Contract.

No.	ITEM	UNIT OF MEASURE	ADD	<b>DEDUCT</b>
<u>1.</u>	NA		\$	\$
2.			\$	\$
3.			\$	\$
4.			\$	\$
<u>5.</u>			\$	\$
6.			\$	\$

BF – 1A SE-330

# § 7. LISTING OF PROPOSED SUBCONTRACTORS PURSUANT TO SECTION 3020(b)(i), CHAPTER 35, TITLE 11 OF THE SOUTH CAROLINA CODE OF LAWS, AS AMENDED

(See Instructions on the following page BF-2A)

Bidder shall use the below-listed Subcontractors in the performance of the Subcontractor Classification work listed:

(A) SUBCONTRACTOR LICENSE CLASSIFICATION or SUBCLASSIFICATION NAME (Completed by Agency)	(B) LICENSE CLASSIFICATION or SUBCLASSIFICATION ABBREVIATION (Completed by Agency)	(C) SUBCONTRACTOR and/or PRIME CONTRACTOR (Required - must be completed by Bidder)	(D) SUBCONTRACTOR'S and/or PRIME CONTRACTOR'S SC LICENSE NUMBER (Requested, but not Required)			
		ASE BID				
NA	NA					
	ALTI	ERNATE #1				
	ALTI	ERNATE #2				
NA						
ALTERNATE #3						
NA						
			•			

If a Bid Alternate is accepted, Subcontractors listed for the Bid Alternate shall be used for the work of both the Alternate and the Base Bid work.

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# INSTRUCTIONS FOR SUBCONTRACTOR LISTING

- 1. Section 7 of the Bid Form sets forth an Agency-developed list of subcontractor license classifications or subclassifications for which Bidder is required to identify the entity (subcontractor(s) and/or himself) Bidder will use to perform this work.
  - a. Columns A & B: The Agency fills out these columns to identify the subcontractor license classification / subclassification and related license abbreviation for which the Bidder must list either a subcontractor or himself as the entity that will perform this work. In Column A, the subcontractor license classification/subclassification is identified by name and in Column B, the related contractor license abbreviation (per Title 40 of the SC Code of Laws) is listed. Abbreviations of licenses can be found at:
    - https://llr.sc.gov/clb/PDFFiles/CLBClassificationAbbreviations.pdf. If the Agnecy has not identified a subcontractor license classification/subclassification, the Bidder does not list a subcontractor.
  - b. Columns C and D: In these columns, the Bidder identifies the subcontractors it will use for the work of each license listed by the Agency in Columns A & B. Bidder must identify only the subcontractor(s) who will perform the work and no others. Bidders must make sure that their identification of each subcontractor is clear and unambiguous. A listing that could be any number of different entities may be cause for rejection of the bid as non-responsive. For example, a listing of M&M without additional information may be problematic if there are multiple different licensed contractors in South Carolina whose names start with M&M.
- 2. **Subcontractor Defined:** For purposes of subcontractor listing, a subcontractor is an entity who will perform work or render service to the prime contractor to or about the construction site pursuant to a contract with the prime contractor. Bidder should not identify sub-subcontractors in the spaces provided on the bid form but only those entities with which Bidder will contract directly. Likewise, do not identify material suppliers, manufacturers, and fabricators that will not perform physical work at the site of the project but will only supply materials or equipment to the Bidder or proposed subcontractor(s).
- 3. Subcontractor Qualifications: Bidder must only list subcontractors who possess a South Carolina contractor's license that includes the license classification and/or subclassification identified by the Agency in Columns A & B. The subcontractor license must also be within the appropriate license group for the work. If Bidder lists a subcontractor who is not qualified to perform the work, the Bidder will be rejected as non-responsible.
- 4. Use of Own forces: If, under the terms of the Bidding Documents and SC Contractor Licensing laws, Bidder is qualified to perform the work of a listed subcontractor classification or subclassification and Bidder does not intend to subcontract such work but to use Bidder's own employees to perform such work, the Bidder must insert itself in the space provided.
- 5. Use of Multiple Subcontractors:
  - a. If Bidder intends to use multiple subcontractors to perform the work of a single license classification/subclassification, Bidder must insert the name of each subcontractor Bidder will use, preferably separating the name of each by the word "and". If Bidder intends to use both his own employees to perform a part of the work of a single license classification/subclassification and to use one or more subcontractors to perform the remaining work, Bidder must insert itself and each subcontractor, preferably separating them with the word "and". Bidder must use each entity listed for the work of a single license classification/subclassification in the performance of that work.
  - b. Optional Listing Prohibited: Bidder may not list multiple subcontractors for a license classification/subclassification in a form that provides the Bidder the option, after bid opening or award, to choose one or more but not all the listed subcontractors to perform the work for which they are listed. A listing, which on its face requires subsequent explanation to determine whether it is an optional listing, is non-responsive. If Bidder intends to use multiple entities to perform the work for a single listing, Bidder must clearly set forth on the bid form such intent. Bidder may accomplish this by simply inserting the word "and" between the names of each entity listed. Agency will reject as non-responsive a listing that contains the names of multiple subcontractors separated by a blank space, the word "or", a virgule (that is a /), or any separator that the Agency may reasonably interpret as an optional listing.
- **6.** If Bidder is awarded the contract, Bidder must, except with the approval of the Agency for good cause shown, use the listed entities to perform the work for which they are listed.
- 7. If Bidder is awarded the contract, Bidder will not be allowed to substitute another entity as subcontractor in place of a subcontractor listed in Section 7 of the Bid except for one or more of the reasons allowed by the SC Code of Laws.
- **8.** Bidder's failure to identify an entity (subcontractor or himself) to perform the work of a subcontractor listed in Columns A & B will render the Bid non-responsive.

BF – 2A SE-330

# § 8. LIST OF MANUFACTURERS, MATERIAL SUPPLIERS, AND SUBCONTRACTORS OTHER THAN SUBCONTRACTORS LISTED IN SECTION 7 ABOVE (FOR INFORMATION ONLY):

Pursuant to instructions in the Invitation for Construction Services, if any, Bidder will provide to Agency upon the Agency's request and within 24 hours of such request, a listing of manufacturers, material suppliers, and subcontractors, other than those listed in Section 7 above, that Bidder intends to use on the project. Bidder acknowledges and agrees that 11 1114

## § 9

		s list is provided for purposes of determining responsibility and not pursuant to the subcontractor listing requirements SC Code § 11-35-3020(b)(i).			
§ 9.	TI	ME OF CONTRACT PERFORMANCE AND LIQUIDATED DAMAGES			
	a)	CONTRACT TIME			
		Bidder agrees that the Date of Commencement of the Work shall be established in a Notice to Proceed to be issued			
		by the Agency. Bidder agrees to substantially complete the Work within Calendar Days			
		from the Date of Commencement, subject to adjustments as provided in the Contract Documents.			
	b)	LIQUIDATED DAMAGES			
		Bidder further agrees that from the compensation to be paid, the Agency shall retain as Liquidated Damages the amount of \$\ \begin{align*} \overline{0.00} \end{align*} for each Calendar Day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted time for Substantial Completion as provided in the Contract Documents. This amount is intended by the parties as the predetermined measure of compensation for actual damages, not as a penalty for nonperformance.			
§ 10.	AGREEMENTS				
	a)	Bidder agrees that this bid is subject to the requirements of the laws of the State of South Carolina.			
	b)	Bidder agrees that at any time prior to the issuance of the Notice to Proceed for this Project, this Project may be canceled for the convenience of, and without cost to, the State.			
	c)	Bidder agrees that neither the State of South Carolina nor any of its agencies, employees or agents shall be responsible for any bid preparation costs, or any costs or charges of any type, should all bids be rejected or the Project canceled for any reason prior to the issuance of the Notice to Proceed.			
§ 11.	EL	ECTRONIC BID BOND			
	Ву	signing below, the Principal is affirming that the identified electronic bid bond has been executed and that the Principal			
		I Surety are firmly bound unto the State of South Carolina under the terms and conditions of the AIA Document A310, I Bond, referenced in the Bidding Documents.			
	EL	ECTRONIC BID BOND NUMBER:			
	SIC	GNATURE AND TITLE:			

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# CONTRACTOR'S CLASSIFICATIONS AND SUBCLASSIFICATIONS WITH LIMITATION SC Contractor's License Number(s):\_\_\_\_\_ Classification(s) & Limits: Subclassification(s) & Limits: By signing this Bid, the person signing reaffirms all representation and certification made by both the person signing and the Bidder, including without limitation, those appearing in Article 2 of the SCOSE Version of the AIA Document A701, Instructions to Bidders, is expressly incorporated by reference. BIDDER'S LEGAL NAME: ADDRESS: TELEPHONE: EMAIL: SIGNATURE: DATE: PRINT NAME: TITLE:\_\_\_\_

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Bidders shall submit bids on only Bid Form SE-330.

RID	SUBMITTED BY					
DID	SOBMITTED BI	•	(Bi	idder's Name)		
BID	SUBMITTED TO	•				
			(Aş	gency's Name)		
FOR	R: PROJECT N	AME: Barnwel	ll County Scho	ol District - FE	MA HMGP Ph	ase II Safe Room
	PROJECT N	UMBER: BCS	D - Safe Room	n 04 Testing &	Inspections	
<b>OFF</b>	<u>ER</u>					
§ 1.	named Project, the un Agency on the terms in	dersigned Bidder pacluded in the Biddices and within the	proposes and agre ing Documents, a	ees, if this Bid is nd to perform all V	accepted, to enter Vork as specified o	to Bidders for the above- into a Contract with the or indicated in the Bidding with the other terms and
§ 2.	Pursuant to SC Code § Documents.	11-35-3030(1), Bi	dder has submitte	d Bid Security in t	he amount and for	m required by the Bidding
§ 3.	Bidder acknowledges said Addenda into this (Bidder, check all that ap ADDENDA:	Bid:		_		ncorporated the effects of hat do not apply)  #5
§ 4.	disposition of Bid Sec	eurity. Bidder agr bening of bids, and	ees that this Bid, shall remain oper	including all Bid n for acceptance f	Alternates, if any or a period of <u>60</u>	on, those dealing with the y, may not be revoked or Days following the Bid Agency.
§ 5.		ees, and to pay all				, accessories, appliances, necessary to complete the
§ 6.1	BASE BID WORK (a	s indicated in the Bi	dding Documents a	and generally descri	bed as follows): <u>T</u>	esting & Inspections
	\$ (Bidder to insert Base	Bid Amount on line	above)	, which sum	is hereafter called	the Base Bid.

BF – 1 SE-330

Bidders shall submit bids on only Bid Form SE-330.

§ 6.2 BID ALTERNATES as indicated in the Bidding Documents and generally described as follows:

ALTERNATE # 1 (Brief Description): NA
☐ ADD TO or ☐ DEDUCT FROM BASE BID: \$
(Bidder to mark appropriate box to clearly indicate the price adjustment offered for each Alternate)
ALTERNATE # 2 (Brief Description):
☐ ADD TO or ☐ DEDUCT FROM BASE BID: \$
(Bidder to mark appropriate box to clearly indicate the price adjustment offered for each Alternate)
ALTERNATE # 3 (Brief Description):
☐ ADD TO or ☐ DEDUCT FROM BASE BID: \$
(Bidder to mark appropriate box to clearly indicate the price adjustment offered for each Alternate)

#### § 6.3 UNIT PRICES:

BIDDER offers for the Agency's consideration and use, the following UNIT PRICES. The UNIT PRICES offered by BIDDER indicate the amount to be added to or deducted from the CONTRACT SUM for each item-unit combination. UNIT PRICES include all costs to the Agency, including those for materials, labor, equipment, tools of trades and labor, fees, taxes, insurance, bonding, overhead, profit, etc. The Agency reserves the right to include or not to include any of the following UNIT PRICES in the Contract and to negotiate the UNIT PRICES with BIDDER prior to including in the Contract.

No.	ITEM	UNIT OF MEASURE	ADD	DEDUCT
<u>1.</u>	NA		\$	\$
2.			\$	\$
3.			\$	\$
4.			\$	\$
<u>5.</u>			\$	\$
6.			\$	\$

BF – 1A SE-330

# § 7. LISTING OF PROPOSED SUBCONTRACTORS PURSUANT TO SECTION 3020(b)(i), CHAPTER 35, TITLE 11 OF THE SOUTH CAROLINA CODE OF LAWS, AS AMENDED

(See Instructions on the following page BF-2A)

Bidder shall use the below-listed Subcontractors in the performance of the Subcontractor Classification work listed:

(A) SUBCONTRACTOR LICENSE CLASSIFICATION or SUBCLASSIFICATION NAME (Completed by Agency)	(B) LICENSE CLASSIFICATION or SUBCLASSIFICATION ABBREVIATION (Completed by Agency)	(C) SUBCONTRACTOR and/or PRIME CONTRACTOR (Required - must be completed by Bidder)	(D) SUBCONTRACTOR'S and/or PRIME CONTRACTOR'S SC LICENSE NUMBER (Requested, but not Required)				
BASE BID							
NA	NA						
ALTERNATE #1							
ALTERNATE #2							
NA							
ALTERNATE #3							
NA							
			•				

If a Bid Alternate is accepted, Subcontractors listed for the Bid Alternate shall be used for the work of both the Alternate and the Base Bid work.

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# INSTRUCTIONS FOR SUBCONTRACTOR LISTING

- 1. Section 7 of the Bid Form sets forth an Agency-developed list of subcontractor license classifications or subclassifications for which Bidder is required to identify the entity (subcontractor(s) and/or himself) Bidder will use to perform this work.
  - a. Columns A & B: The Agency fills out these columns to identify the subcontractor license classification / subclassification and related license abbreviation for which the Bidder must list either a subcontractor or himself as the entity that will perform this work. In Column A, the subcontractor license classification/subclassification is identified by name and in Column B, the related contractor license abbreviation (per Title 40 of the SC Code of Laws) is listed. Abbreviations of licenses can be found at:
    - https://llr.sc.gov/clb/PDFFiles/CLBClassificationAbbreviations.pdf. If the Agnecy has not identified a subcontractor license classification/subclassification, the Bidder does not list a subcontractor.
  - b. Columns C and D: In these columns, the Bidder identifies the subcontractors it will use for the work of each license listed by the Agency in Columns A & B. Bidder must identify only the subcontractor(s) who will perform the work and no others. Bidders must make sure that their identification of each subcontractor is clear and unambiguous. A listing that could be any number of different entities may be cause for rejection of the bid as non-responsive. For example, a listing of M&M without additional information may be problematic if there are multiple different licensed contractors in South Carolina whose names start with M&M.
- 2. **Subcontractor Defined:** For purposes of subcontractor listing, a subcontractor is an entity who will perform work or render service to the prime contractor to or about the construction site pursuant to a contract with the prime contractor. Bidder should not identify sub-subcontractors in the spaces provided on the bid form but only those entities with which Bidder will contract directly. Likewise, do not identify material suppliers, manufacturers, and fabricators that will not perform physical work at the site of the project but will only supply materials or equipment to the Bidder or proposed subcontractor(s).
- 3. Subcontractor Qualifications: Bidder must only list subcontractors who possess a South Carolina contractor's license that includes the license classification and/or subclassification identified by the Agency in Columns A & B. The subcontractor license must also be within the appropriate license group for the work. If Bidder lists a subcontractor who is not qualified to perform the work, the Bidder will be rejected as non-responsible.
- 4. Use of Own forces: If, under the terms of the Bidding Documents and SC Contractor Licensing laws, Bidder is qualified to perform the work of a listed subcontractor classification or subclassification and Bidder does not intend to subcontract such work but to use Bidder's own employees to perform such work, the Bidder must insert itself in the space provided.
- 5. Use of Multiple Subcontractors:
  - a. If Bidder intends to use multiple subcontractors to perform the work of a single license classification/subclassification, Bidder must insert the name of each subcontractor Bidder will use, preferably separating the name of each by the word "and". If Bidder intends to use both his own employees to perform a part of the work of a single license classification/subclassification and to use one or more subcontractors to perform the remaining work, Bidder must insert itself and each subcontractor, preferably separating them with the word "and". Bidder must use each entity listed for the work of a single license classification/subclassification in the performance of that work.
  - b. Optional Listing Prohibited: Bidder may not list multiple subcontractors for a license classification/subclassification in a form that provides the Bidder the option, after bid opening or award, to choose one or more but not all the listed subcontractors to perform the work for which they are listed. A listing, which on its face requires subsequent explanation to determine whether it is an optional listing, is non-responsive. If Bidder intends to use multiple entities to perform the work for a single listing, Bidder must clearly set forth on the bid form such intent. Bidder may accomplish this by simply inserting the word "and" between the names of each entity listed. Agency will reject as non-responsive a listing that contains the names of multiple subcontractors separated by a blank space, the word "or", a virgule (that is a /), or any separator that the Agency may reasonably interpret as an optional listing.
- **6.** If Bidder is awarded the contract, Bidder must, except with the approval of the Agency for good cause shown, use the listed entities to perform the work for which they are listed.
- 7. If Bidder is awarded the contract, Bidder will not be allowed to substitute another entity as subcontractor in place of a subcontractor listed in Section 7 of the Bid except for one or more of the reasons allowed by the SC Code of Laws.
- **8.** Bidder's failure to identify an entity (subcontractor or himself) to perform the work of a subcontractor listed in Columns A & B will render the Bid non-responsive.

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# § 8. LIST OF MANUFACTURERS, MATERIAL SUPPLIERS, AND SUBCONTRACTORS OTHER THAN SUBCONTRACTORS LISTED IN SECTION 7 ABOVE (FOR INFORMATION ONLY):

Pursuant to instructions in the Invitation for Construction Services, if any, Bidder will provide to Agency upon the Agency's request and within 24 hours of such request, a listing of manufacturers, material suppliers, and subcontractors, other than those listed in Section 7 above, that Bidder intends to use on the project. Bidder acknowledges and agrees that 11 1114

## § 9

		s list is provided for purposes of determining responsibility and not pursuant to the subcontractor listing requirements SC Code § 11-35-3020(b)(i).				
§ 9.	TI	ME OF CONTRACT PERFORMANCE AND LIQUIDATED DAMAGES				
	a)	CONTRACT TIME				
		Bidder agrees that the Date of Commencement of the Work shall be established in a Notice to Proceed to be issued				
		by the Agency. Bidder agrees to substantially complete the Work within Calendar Days				
		from the Date of Commencement, subject to adjustments as provided in the Contract Documents.				
	b)	LIQUIDATED DAMAGES				
		Bidder further agrees that from the compensation to be paid, the Agency shall retain as Liquidated Damages the amount of \$\ \begin{align*} \overline{0.00} \end{align*} for each Calendar Day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted time for Substantial Completion as provided in the Contract Documents. This amount is intended by the parties as the predetermined measure of compensation for actual damages, not as a penalty for nonperformance.				
§ 10.	A(	GREEMENTS				
	a)	Bidder agrees that this bid is subject to the requirements of the laws of the State of South Carolina.				
	b)	Bidder agrees that at any time prior to the issuance of the Notice to Proceed for this Project, this Project may be canceled for the convenience of, and without cost to, the State.				
	c)	Bidder agrees that neither the State of South Carolina nor any of its agencies, employees or agents shall be responsible for any bid preparation costs, or any costs or charges of any type, should all bids be rejected or the Project canceled for any reason prior to the issuance of the Notice to Proceed.				
§ 11.	EL	ECTRONIC BID BOND				
	Ву	signing below, the Principal is affirming that the identified electronic bid bond has been executed and that the Principal				
		I Surety are firmly bound unto the State of South Carolina under the terms and conditions of the AIA Document A310, I Bond, referenced in the Bidding Documents.				
	EL	ECTRONIC BID BOND NUMBER:				
	SIC	GNATURE AND TITLE:				

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# SE-330 LUMP SUM BID FORM

# CONTRACTOR'S CLASSIFICATIONS AND SUBCLASSIFICATIONS WITH LIMITATION SC Contractor's License Number(s):\_\_\_\_\_ Classification(s) & Limits: Subclassification(s) & Limits: By signing this Bid, the person signing reaffirms all representation and certification made by both the person signing and the Bidder, including without limitation, those appearing in Article 2 of the SCOSE Version of the AIA Document A701, Instructions to Bidders, is expressly incorporated by reference. BIDDER'S LEGAL NAME: ADDRESS: TELEPHONE: EMAIL: SIGNATURE: DATE: PRINT NAME: TITLE:\_\_\_\_

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#### SECTION 01 10 00 - SUMMARY

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

#### A. Section Includes:

- 1. Project information.
- 2. Work covered by Contract Documents.
- 3. General requirements of Contract.
- 4. Use of premises.
- 5. Protection of Persons and Property.
- 6. Owner's Occupancy Requirements.
- 7. Schedule/Work restrictions.
- 8. Coordination.

#### 1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, the condition at which roofing is insulated and weathertight; exterior walls are insulated and weathertight; all openings are closed with permanent construction; and all exterior joints are sealed.

#### 1.4 PROJECT INFORMATION

- A. Project Identification: Barnwell County School District, FEMA HMGP Phase II Safe Room
  - 1. Project Locations:
    - a. Barnwell High School, 474 Jackson Street, Barnwell, SC 29812.
- B. Owner's Representative: Holly Hutto
  - 1. Address: 770 Hagwood Avenue, Barnwell, SC 29812
- C. Owner: Barnwell County School District
  - 1. Address: 770 Hagwood Avenue, Barnwell, SC 29812
- D. Architect: Tetra Tech.
  - 1. Address: 240 Continental Drive, Suite 200, Newark DE 19713.

E. Building Code in effect for Project: 2021 International Building Code (IBC) with local amendments.

#### 1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
- B. This project is to construct a concrete dome structural for a FEMA safe room/public shelter for emergency use. The structure when not used as an emergency shelter, will be a gymnasium to host sports and different types of event. The building with the sitework will be located on an existing running track.
- C. Contract: Provide Testing Service and Inspections (Section 01 45 23 Testing and Inspecting Services) and Commissioning (Section 01 91 00 Commissioning & Section 23 08 00 Commissioning of HVAC) for BCSD for the project being constructed by H.G. Reynolds

#### 1.6 USE OF PREMISES

- A. Use of the Site: Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project renovations.
  - 1. Keep driveways and entrances serving the premises clear and available for the Owner's use at all times. Do not use these areas for parking or storage of materials, except as directed by the Owner's Representative.
  - 2. Do not encumber the site with materials or equipment. Confine stockpiling of materials to the areas directed by the Owner's Representative. If storage is necessary, obtain and pay for such storage beyond the secure perimeter or off site.
  - 3. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment when parked and unattended to prevent unauthorized use. Do not leave such vehicle or equipment unattended with the motor running or the ignition key in place.
  - 4. Parking areas for employees of the Contractor shall be designated in the vicinity of the project, and it shall be the responsibility of the Contractor to require its personnel to park in this designated area and not any area, which may interfere with the Owner's normal operations.

#### 1.7 PROTECTION OF PERSONS AND PROPERTY

- A. The Contractor shall provide ample and approved provisions for the protection of any area, which may be considered a hazard for any persons and vehicles operating in the area. All hazards such as trenches, stored material, work areas, etc., shall be neatly barricaded and lighted.
  - 1. The safeguard measures for this project shall comply, at a minimum, with all applicable sections of the Occupational, Health, and Safety Act, with the latest addenda.

#### 1.8 OWNER'S OCCUPANCY REQUIREMENTS

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

#### 1.9 SCHEDULE/WORK RESTRICTIONS

A. Timely execution of this project is a critical element of the Work. Working dates TDB. Normal working hours are between 7:00 a.m. to 4:30 p.m., Monday thru Friday. Work after hours is negotiable. Note: If project is behind schedule, every effort should be made to maintain schedule including working overtime at the expense of the Contractor.

#### 1.10 COORDINATION

- A. General: The work of this Contract includes coordination of the entire work of the project, including preparation of general coordination drawings, diagrams and schedules, and control of site utilization, from the beginning of the demolition activity through the project closeout and warranty periods.
- B. Copies of governing regulations, which have a bearing on the performance of the work, can be obtained from or reviewed at the local, State, or Federal Agency responsible for the regulation in each case.
- C. Miscellaneous elements of information having a bearing on the performance of the work, such as weather forecasts and reports of general trade union negotiations; copies must be obtained by the Contractor through normal channels of information.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

**END OF SECTION** 

#### SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

#### 1.3 MINOR CHANGES IN THE WORK

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

#### 1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal Requests issued by the Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to the Architect. Refer to Procedures outlined in the *Supplementary Conditions* of the Contract.

#### 1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, the Architect will issue a Change Order for signatures of Owner and Contractor on Document SE-380 Change Order to DBB Contract.

#### 1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Work Change Directive: The Architect may issue a SE-380 Change Order Request Summary DBB. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  - 1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

- B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.
  - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

#### SECTION 01 29 00 - PAYMENT PROCEDURES

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment. The project is a FEMA Hazard Mitigation Grant Program and FEMA will be reimbursing the School for all the eligible associated costs. This project has what FEMA called Ineligible costs that FEMA will not reimbursing see 1.4 B. 12. for more information. This does not mean the ineligible items are not part of the construction, they just need to be accounted for separately.

#### B. Related Requirements:

- 1. Section 01 22 00 "Unit Prices" for administrative requirements governing the use of unit prices.
- 2. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
- 3. Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

#### 1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

#### 1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with continuation sheets.
    - b. Submittal schedule.
    - c. Items required to be indicated as separate activities in Contractor's construction schedule.

- 2. Submit the schedule of values to Architect through Construction Manager at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
- 4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
- 5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract as described in Section 01 10 00 "Summary."
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section. The will need to be tow schedule of values, one for eligible costs and one for ineligible costs, see 1.4 B. 12. for more information
  - 1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Name of Architect.
    - c. Architect's project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  - 2. Arrange schedule of values consistent with format of AIA Document G703.
  - 3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
    - a. Related Specification Section or Division.
    - b. Description of the Work.
    - c. Name of subcontractor.
    - d. Name of manufacturer or fabricator.
    - e. Name of supplier.
    - f. Change Orders (numbers) that affect value.
    - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
      - 1) Labor.
      - 2) Materials.
      - 3) Equipment.
  - 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

- a. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
- 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
- 6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
  - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
- 7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- 8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
- 9. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
- 10. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
  - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
- 11. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.
- 12. There is a list of the items that FEMA lists as ineligible costs (for a more details see FEMA Part ix. Additional Project Guidance: C. Hazardous Mitigation for Safe Room attached to the end of this spec): casework, all finishes, toilet room accessories, electrical outlets, gym equipment PA systems, Washer / Dryer, food services equipment, bleachers, lockers, security systems, data wiring, sitework (except side walk and curb next to the building).

#### 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and Construction Manager and paid for by Owner.
  - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Architect by the of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
  - 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- E. Application for Payment Forms: Use forms provided by Owner for Applications for Payment. Sample copies are included in Project Manual.
- F. Application for Payment Forms: Use forms acceptable to Architect, Construction Manager and Owner for Applications for Payment. Submit forms for approval with initial submittal of schedule of values.
- G. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect/Construction Manager will return incomplete applications without action.
  - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
  - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- H. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
  - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
  - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  - 3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.

- c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- I. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
  - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- J. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
  - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  - 2. When an application shows completion of an item, submit conditional final or full waivers
  - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  - 4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- K. Waivers of Mechanic's Lien: 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.
  - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  - 2. When an application shows completion of an item, submit conditional final or full waivers.
  - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  - 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  - 5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.
- L. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
  - 1. List of subcontractors.
  - 2. Schedule of values.
  - 3. Sustainable design submittal for project materials cost data.
  - 4. Contractor's construction schedule (preliminary if not final).
  - 5. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
  - 6. Products list (preliminary if not final).
  - 7. Sustainable design action plans.
  - 8. Schedule of unit prices.
  - 9. Submittal schedule (preliminary if not final).
  - 10. List of Contractor's staff assignments.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

**END OF SECTION** 

#### SECTION 01 33 00 - SUBMITTAL PROCEDURES AND REQUIREMENTS

#### PART 1 - GENERAL

#### 1.1 SECTIONS INCLUDES

- A. Administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Contractor's and Engineer's duties and responsibilities.
- C. Submission Requirements: As required by the Contract Documents for all materials, products, equipment and systems to be furnished and installed under this Contract, unless specifically indicated otherwise.
- D. Action Submittal and Informational Submittal: Description of submittal review dispositions and resubmissions.

#### 1.2 RELATED SECTIONS

- A. Section 01 25 00 "Substitution Procedures"
- B. Section 01 40 00 "Quality Requirements"
- C. Section 01 77 00 "Closeout Procedures"
- D. Section 01 78 23 "Operation and Maintenance Date"
- E. Sections for Divisions 02 through 46—Required Submittals

#### 1.3 DEFINITIONS

- A. Contractor's Registered Design Professional (RDP): An individual representing the Contractor or his suppliers or subcontractors who is licensed to practice engineering as defined by the statutory requirements of the professional licensing laws in the state or jurisdiction in which the project is to be constructed.
- B. "Or-Equal" Items: Material or equipment proposed by Contractor that is functionally equal to that named and sufficiently similar so that no change in related Work will be required.
- C. Product Data: Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
- D. Samples: Physical examples that illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.
- E. Shop, Fabrication and/or Layout Drawings: Shop Drawings are drawings, diagrams, schedules, and other data specifically prepared for the Work by the Contractor, subcontractor at any tier, manufacturer, supplier or distributor, to illustrate some portion of the Work.

- F. Submittals: Documents or materials submitted to the Engineer for review prior to installing the materials, products or components into the Work, as noted below:
  - 1. Action Submittal: Written and graphic information submitted by Contractor that requires Engineer's responsive action.
  - 2. Informational Submittal: Written information submitted by Contractor that may not require Engineer's review and disposition.
  - 3. Submittals may be rejected for not complying with the terms and conditions of the Contract and project-specific requirements

#### G. Substitutions:

- 1. A request for use of an alternative material, equipment or procedure which is different than shown in the documents that provides performance equivalent to what is shown in the documents
- 2. Submit under provisions of Section 01 25 00 "Substitution Procedures"

#### 1.4 GENERAL

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier, the specification or description is intended to establish the type, function, appearance, and quality required.
- B. Unless the specification or description contains or is followed by words reading that no like, no equivalent, or no "or-equal" item or no substitution is permitted, other items of material or equipment of other suppliers may be submitted to Engineer for review.
- C. Product or equipment substitution requests must meet the same performance requirements as the specified product and are subject to review as a substitution and final disposition by Engineer per requirements of Section 01 25 00 "Substitution Procedures".
- D. Construction Schedule: Designate in the construction schedule, or in a separate coordinated submittal registry/log or shop drawing schedule, the dates for submission and the dates that reviewed Action Submittals for Shop Drawings and Product Data are anticipated.
- E. Submittal Registry/Log: Within 15 calendar days from execution of Contract a complete registry/log of anticipated submittals shall be delivered to Engineer. This registry/log shall include all items of work that will require review, submittal disposition and other required comments before said materials, products, equipment or systems have been procured and/or delivered to the site.

#### 1.5 SUBMITTALS

#### A. Electronic Submittals:

- 1. Submittals shall, unless specifically accepted, be made in electronic format.
- 2. Each submittal shall be an electronic file in Adobe Portable Document Format (PDF). Use the latest version available at time of execution of the Agreement.
- 3. Electronic files that contain more than 10 pages in PDF format shall contain internal bookmarking from an index page to major sections of the document.

- 4. PDF files shall be set to open "Bookmarks and Page" view.
- 5. Add general information to each PDF file, including: Title, subject, author, and keywords. PDF files shall be text searchable (OCR'd).
- 6. PDF files shall be set up to print correctly (legible and correctly sized) at 8.5-inch by 11-inch, 11-inch by 17-inch, or 22-inch by 34-inch. No other paper sizes will be accepted.
- 7. Submit new and complete electronic files for each resubmittal.
- 8. Include a copy of the Contractor's Submittal Transmittal and Response form, or similar form with each electronic file. Contractor shall provide a sample form at Pre-Construction Conference.
- 9. Include Contractor and Engineer authorization to reproduce and distribute each file.
- 10. Detailed procedures for handling electronic submittals will be discussed at the preconstruction conference.

# B. Shop, Fabrication and/or Layout Drawings—Drawings shall be presented in a clear and thorough manner:

- 1. Identify details by reference to sheet and detail, schedule or room numbers shown on Contract Drawings.
- 2. Identify equipment by reference to equipment name and tag number shown on Contract Drawings.
- 3. Scale and Measurements: Make drawings accurate to a scale with sufficient detail to show the kind, size, arrangement and function of component materials and devices
- 4. Minimum sheet size: 8-1/2 inch by 11 inch.
- 5. Fabrication/layout drawing size: 11 inch by 17 inch or 22 inch by 34 inch.

#### C. Product Data—Preparation:

- 1. Clearly mark each copy to identify pertinent products or models submitted for review.
- 2. Identify equipment by reference to equipment name and tag number.
- 3. Catalog cut sheets: Cross-out or delete irrelevant data.
- 4. Show performance characteristics and capacities.
- 5. Show dimensions and clearances required for installation and maintenance.
- 6. Show wiring or piping diagrams and controls.
- 7. Show external connections, anchorages, and supports required.

#### D. "Certificate of Compliance":

- 1. Provided by manufacturer or supplier in lieu of submittal data typically required, per Engineer's written authorization or as scheduled herein.
- 2. Certifies that product data or item identified in certificate is in total compliance with Contract Document requirements.
- 3. Specifically identifies project name and that there is no deviation from Contract Documents.
- 4. Identify equipment by reference to equipment name and tag number
- 5. Identify limits of equipment, materials or work provided.
- 6. Provide for specific product data or item only as approved by Engineer or as indicated herein.

E. Construction Schedule: Designate in the construction schedule, or in a separate coordinated shop drawing schedule, the dates for submission and the dates that reviewed Action Submittals for Shop Drawings and Product Data will be needed.

#### F. Samples:

- 1. Copies: Two, unless otherwise specified in individual specifications.
- 2. Preparation: Mount, display, or package Samples in manner specified to facilitate review of quality. Attach label on unexposed side that includes the following:
  - a. Manufacturer name.
  - b. Model number.
  - c. Material.
  - d. Sample source.
- 3. Manufacturer's Color Chart: Units or sections of units showing full range of colors, textures, and patterns available.
- 4. Full-size Samples:
  - a. Size as indicated in individual specification section.
  - b. Prepared from same materials to be used for the Work.
  - c. Cured and finished in manner specified.
  - d. Physically identical with product proposed for use.
- G. Manufacturer's standard schematic drawings and diagrams:
  - 1. Modify drawings and diagrams to delete information which is not applicable to the Work by crossing out or omitting irrelevant data.
  - 2. Supplement standard information to provide information specifically applicable to the Work.
- H. Field samples and mock-ups:
  - 1. Contractor shall erect, at the Project site, at a location acceptable to Engineer.
  - 2. Size or area: That specified in the respective specification section.
  - 3. Fabricate each sample and mock-up complete and finished.
  - 4. Remove mock-ups at conclusion of Work or when acceptable to Engineer.

#### 1.6 SUBMITTAL PROCEDURES

A. General: Electronic copies of CAD Drawings of the Contract Drawings will be available for Contractor's reference in preparing submittals.

- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities:
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
  - 3. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

#### C. Identification:

- 1. Place a permanent label or title block on each submittal for identification.
- 2. Indicate name of firm or entity that prepared each submittal on label or title block.
- 3. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
- 4. Include the following information on label for processing and recording action taken:
- 5. Project name.
- 6. Date.
- 7. Name and address of Owner and Engineer.
- 8. Name and address of Contractor.
- 9. Name and address of subcontractor.
- 10. Name and address of supplier.
- 11. Name of manufacturer.
- 12. Unique identifier, including revision number.
- 13. Number and title of appropriate Specification Section.
- 14. Drawing number and detail references, as appropriate.
- 15. Other necessary identification.

#### D. Confirmation of compliance with Contract Documents:

- 1. Unless a Certificate of Compliance is permitted for material or equipment where specified, provide the following documents to demonstrate compliance with the Contract Documents:
  - a. Copy of relevant Drawings with all addendum updates that apply to equipment or systems in Divisions 25, 26, 33, 44 and 46 marked to show specific changes necessary for equipment proposed in Contractor's submittal:
    - 1) If no changes are required, Drawing(s) shall be marked "no changes required".
    - 2) Failure to include copies of relevant drawings with submittal, whether changes are required or not, shall be cause for rejection of entire submittal with no further review by Engineer.
    - 3) Relevant Drawings include as a minimum control diagrams, process and instrumentation diagrams (P&IDs), and Process Drawings.
  - b. A copy of each pertinent specification section in Divisions 25, 26, 33, 44 and 46 with all addendum updates included, and all referenced and applicable

specification sections, with their respective addendum updates included, with each paragraph check-marked to indicate specification compliance.

c. Otherwise mark to indicate requested deviations from specification requirements.

#### E. Identification of deviations from Contract Documents:

- 1. If Contractor proposes to provide material or equipment of work which deviates from the Contract Documents, indicate so under "deviations" on the transmittal form accompanying the submittal copies.
- 2. Identify all requested deviations as specified and on copies of specifications and Drawings.
- 3. Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- 4. If deviations from specifications are indicated and, therefore requested by Contractor, the submittal shall be accompanied by a detailed, written justification for each deviation.
- 5. Failure to include a copy of marked-up specification sections, along with justification for any requested deviations to specification requirements, with the submittal shall be cause for rejection of the entire submittal with no further review by Engineer.

#### F. Transmittal:

- 1. Package each submittal individually and appropriately for transmittal and handling.
- 2. Engineer will discard submittals received from sources other than Contractor.
- 3. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
- 4. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
- 5. Transmittal Form: Submit sample transmittal form for approval or use the sample form at the end of this Section for transmittal of submittals. Include an 8-inch by 4-inch blank space for Contractor's and Engineer's stamps.
- 6. Electronically stamp cover sheet of each submittal as identified in letter of transmittal
- 7. Contractor's stamp: Initialed or signed, certifying review and approval of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the Work and of Contract Documents. Use stamp to include wording similar to the following:

CONTRACTOR 'S CERTIFICATION
I CERTIFY THAT THIS SUBMITTAL HAS BEEN
REVIEWED AND APPROVED BY THE CONTRACTOR IN
ACCORDANCE WITH THE GENERAL CONDITIONS.
BY

#### G. Submittal Registry/Log:

1. Maintain an accurate submittal registry/log for duration of the Work showing current status of all submittals.

- 2. Show submittal number, section number, section title, submittal description dates and disposition of submittal.
- 3. Make submittal registry/log available to Engineer for Engineer's review upon request.
- H. Unless specified otherwise, make submissions in groups to facilitate efficient review and approval:
  - 1. Include all associated items from individual specification sections to assure that all information is available for checking each item when it is received.
  - 2. Submit a complete initial submittal including all components when an item consists of components from several sources.
  - 3. Partial submittals may be rejected as not complying with provisions of the Contract
  - 4. Engineer will not be held liable for delays due to poorly organized or incomplete submittals.
  - 5. Do not include items from more than one specification section for any one submittal number.
- I. Contractor may require subcontractors to provide drawings, setting diagrams and similar information to help coordinate the Work, but such data shall remain between Contractor and his subcontractors and will not be reviewed by Engineer unless specifically called for within the Contract Documents.
- J. All submittals for each component of multi-component systems shall be compiled and submitted through the Contractor to the Engineer by the manufacturer having system responsibility.
- K. Distribution: Forward final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- L. Use for Construction: Use only final submittals with mark indicating action taken by Engineer in connection with construction.

### 1.7 DISPOSITION OF SHOP DRAWINGS AND PRODUCT DATA

- A. "No Exceptions Noted" Acceptable with no exceptions noted:
  - 1. Electronic copy returned to Contractor for his use:
    - a. One hard copy to be kept on file at Contractor's office at job site
  - 2. No corrections or comments noted on submittal or in transmittal letter.
  - 3. Issues or miscellaneous comments pertaining to other related items of the Work may be included.
  - 4. Resubmission not required.
- B. "Exceptions Noted See Comments" Acceptable with required exceptions/corrections noted:
  - 1. Electronic copy returned to Contractor for his use:
    - a. One hard copy to be kept on file at Contractor's office at job site.

- b. Copies of submittal data in operation and maintenance manuals to be revised according to corrections.
- 2. Comply with corrections or comments as noted on submittal and in transmittal letter.
- 3. Resubmission not required.
- C. "Revise And Resubmit" Incorrect or specific information still required:
  - 1. Copy of transmittal letter or submittal review comments sent to Contractor.
  - 2. A submittal will be returned to Contractor upon resubmission and review completed per above disposition requirements
  - 3. Submittal is either: incorrectly annotated; specific comments need to be addressed and incorporated in resubmittal; and/or additional information may be required as noted in transmittal letter or submittal review comments.
  - 4. Submitted information may not include or address specific item required per the specification as identified in transmittal letter or submittal review comments.
  - 5. Specific information related to identified item may be required for final approval of submittal
  - 6. Resubmission of entire submittal may be required or resubmission of specific item may be required as identified in transmittal letter or submittal review comments.
- D. "Receipt Acknowledged For Information Only" For general reference purposes only or for record copy:
  - 1. Applicable to Certificates of Compliance, manufacturer and/or Contractor provided calculations, and other miscellaneous documentation not subject to Engineer review
  - 2. Copy of transmittal letter or submittal review comments sent to Contractor
  - 3. No further action: Detailed review and comment by Engineer not required
  - 4. Resubmission not required

#### 1.8 DISPOSITION OF SAMPLES

- A. "No Exceptions Noted" Acceptable with no exceptions noted:
  - 1. One sample sent to Owner
  - 2. One sample sent to Resident Project Representative
  - 3. One sample retained in Engineer's file
  - 4. Acknowledgment: Copy of transmittal letter or submittal review comments sent to Contractor
  - 5. Resubmission not required
- B. "Exceptions Noted See Comments" Acceptable with required exceptions/corrections noted:
  - 1. One sample sent to Owner
  - 2. One sample sent to Resident Project Representative
  - 3. One sample retained in Engineer's file
  - 4. Acknowledgment: Copy of transmittal letter or submittal review comments sent to Contractor
  - 5. Work performed or products furnished to comply with exceptions noted in acknowledgment

- 6. Resubmission not required
- C. "Revise and Resubmit" Returned for correction:
  - 1. One sample retained in Engineer's file
  - 2. Remaining samples sent to Contractor for resubmittal and compliance with the Contract Documents as noted in transmittal letter or submittal review comments
  - 3. Copy of transmittal letter or submittal review comments sent to Owner
  - 4. Resubmission required

#### 1.9 RESUBMISSION REQUIREMENTS

- A. Make any corrections or changes in submittals required by Engineer and resubmit until considered acceptable.
- B. Clearly include identification of revisions on resubmissions.
- C. Transmit each resubmission under new letter of transmittal. Use number of original submittal followed directly by a capital letter corresponding to the number of times a submittal is resubmitted (i.e., 1, 1A, 1B, etc.)
- D. Shop Drawings and Product Data:
  - 1. Revise initial Drawings or data and resubmit as specified for the initial submittal
  - 2. Indicate any changes which have been made other than those requested by Engineer
- E. Samples: Submit new samples as required for initial submittal
- F. Reimbursement of Resubmission Review Costs:
  - 1. Review of first submittal [and one resubmittal] will be performed by Engineer at no cost to the Contractor
  - 2. Costs for review of subsequent resubmissions will be directly paid by Contractor
  - 3. Engineer will document work-hours required for review and costs for Engineer review will be deducted from payments due Contractor as Change Order deducts
  - 4. Charges for review of resubmissions will include Engineer at maximum rate of [\$175] per hour and Document Control/Submittal Clerk at maximum rate of [\$78] per hour

#### 1.10 ENGINEER'S DUTIES

- A. Review submittals with reasonable promptness and in accord with accepted submittal schedule provided that each submittal has been called for by the Contract Documents and is stamped by Contractor as indicated above:
  - 1. In the event that Engineer will require more than 14 [21] calendar days to perform an expedited submittal review as requested by Contractor, Engineer shall so notify Contractor or indicate so on the submittal schedule
  - 2. No extensions of time are allowed due to Engineer's delay in reviewing submittals unless all the following criteria are met:

- a. Contractor has notified Engineer in writing that an expedited review of particular submittal in question is critical to the progress of the Work and Contractor has identified the requested submittal return date
- b. Engineer has failed to return submittal within 14 [21] days of receipt of the submittal or receipt of said notice, whichever is later
- c. Contractor demonstrates that delay in progress of the Work was directly attributable to Engineer's failure to return submittal within 14 [21] days
- 3. No extensions of time are allowed due to delays in progress of the Work caused by rejection and subsequent resubmission of data, including multiple resubmissions
- B. Review drawings and data submitted only for general conformity with Contract Documents:
  - 1. Engineer's review of drawings and data returned marked "No Exceptions Noted" or "Exceptions Noted" does not indicate a thorough review of all dimensions, quantities, and details of material, equipment device or items shown
  - 2. Engineer's review does not relieve Contractor of responsibility for errors, omissions or deviations nor Contractor's responsibility for compliance with the Contract Documents
  - 3. Engineer's review shall not extend to means, methods, techniques, sequences, operations of construction, and safety precautions and programs incidental thereto. No information regarding these items will be reviewed whether or not included in submittals
- C. Assume that no shop Drawing or related submittal comprises a deviation to the Contract Documents unless Contractor advises Engineer otherwise in writing which is acknowledged by Engineer in writing:
  - 1. Consider and review only those deviations from the Contract Documents clearly identified as such in submittal and tabulated in the letter of transmittal
  - 2. At the discretion of Engineer, notify Contractor that review of specific deviations will be reviewed under provisions of Section 01 25 00 "Substitution Procedures"
- D. Return submittals to Contractor for distribution or for resubmission
- E. Transmit, unreviewed, to Contractor all submittals received directly from suppliers, manufacturers and subcontractors
- F. Transmit, unreviewed, to Contractor all submittals not called for by the Contract Documents or which have not been approved by Contractor
- G. Engineer will not review uncalled-for shop drawings or product data except by special arrangement
- H. Affix stamp and indicate submittal disposition or resubmission requirements with the following stamp:

ARCHITECT/ENGINEER'S REVIEW OF THIS SUBMITTAL IS ON DETERMINE IF THE ITEMS COVERED BY THE SUBMITTAL V CONFORM TO THE CONTRACT DOCUMENTS AND BE COMPA WITH THE DESIGN CONCEPT OF THE COMPLETED PROJE ARCHITECT/ENGINEER'S REVIEW DOES NOT EXTEND TO ME METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES CONSTRUCTION OR TO SAFETY PRECAUTIONS OR PROGR INCIDENT THERETO. ARCHITECT/ENGINEER'S REVIEW OF SUBMITTAL DOES NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY FOR ANY VARIATION FROM THE REQUIREM OF THE CONTRACT DOCUMENTS CONTRACTOR IS RESPONSIBILITY AND IS REFERRED TO THE SPECIFICATIONS MORE DETAIL REGARDING THE CONTRACTOR'S RESPONSIBILITIES FOR SUBMITTALS.	WILL TIBLE CT. EANS, OF AMS THIS MENTS SIBLE RACT			
NO EXCEPTIONS TAKEN				
EXCEPTIONS NOTED				
REVISE AND RESUBMIT				
RECEIPT ACKNOWLEDGED – FOR INFORMATION ONLY				
Tetra Tech				
By:Date:				

PART 2 - PRODUCTS (NOT USED)

#### **PART 3 - EXECUTION**

#### 3.1 ACTION SUBMITTALS

- A. Confirm and comply with requirements of individual technical specifications for Divisions 02 through 46.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment:
  - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's written recommendations.
    - b. Manufacturer's product specifications.
    - c. Manufacturer's installation instructions.
    - d. Standard color charts.
    - e. Manufacturer's catalog cuts.

- f. Wiring diagrams showing factory-installed wiring.
- g. Printed performance curves.
- h. Operational range diagrams.
- i. Mill reports.
- j. Standard product operating and maintenance manuals.
- k. Compliance with recognized trade association standards.
- 1. Compliance with recognized testing agency standards.
- m. Application of testing agency labels and seals.
- n. Notation of coordination requirements.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data:
  - 1. Preparation: Include the following information, as applicable:
    - a. Dimensions.
    - b. Identification of products.
    - c. Fabrication and installation drawings.
    - d. Roughing-in and setting diagrams.
    - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    - f. Shopwork manufacturing instructions.
    - g. Templates and patterns.
    - h. Schedules.
    - i. Design calculations.
    - j. Compliance with specified standards.
    - k. Notation of coordination requirements.
    - 1. Notation of dimensions established by field measurement.
  - 2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
  - 3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 22 by 34 inches.
- D. Coordination Drawings: Comply with requirements in Division 01, Section 01 31 00 "Project Management and Coordination".
- E. Samples: Prepare physical units of materials or products, including the following:
  - 1. Comply with requirements in Division 01, Section 01 40 00 "Quality Requirements" for mockups.
  - 2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
  - 3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing

- color, texture, and pattern; color range sets; and components used for independent testing and inspection.
- 4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Engineer's sample where so indicated. Attach label on unexposed side that includes the following:
  - a. Generic description of Sample.
  - b. Product name or name of manufacturer.
  - c. Sample source.
- 5. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:
  - a. Size limitations.
  - b. Compliance with recognized standards.
  - c. Availability.
  - d. Delivery time.
- 6. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
  - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
  - b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
- 7. Number of Samples for Initial Selection: Submit four (4) full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
  - a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
- 8. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
  - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
  - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

- F. Product Schedule or List: Prepare a written summary indicating types of general products required for the Work and their intended location. Include the following information in tabular form:
  - 1. Type of product. Include unique identifier for each product.
  - 2. Number and name of room or space.
  - 3. Location within room or space.
- G. Delegated-Design Submittal: Comply with requirements in Division 01, Section 01 40 00 "Quality Requirements" and per related technical specification.
- H. Submittals Schedule: Comply with requirements in Division 01, Section 01 32 00 "Construction Progress Documentation" and as specified herein.
- I. Contractor's Construction Schedule: Comply with requirements in Division 01, Section 01 32 00 "Construction Progress Documentation" for action.
- J. Application for Payments: Comply with requirements of Contract Documents and Division 01, Section 01 29 00 "Payment Process".
- K. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.

#### 3.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections:
  - 1. Certificates and Certifications: Provide a notarized statement that includes signature of Contractor, testing agency, or design professional responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of the company.
  - 2. Test and Inspection Reports: Comply with requirements in Division 01, Section 01 40 00 "Quality Requirements".
- B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Engineers and Owners, and other information specified.
- C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
- I. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.
- J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.
- L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- M. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- N. Operation and Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 01, Section 01 78 23 "Operation and Maintenance Data".
- O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of

assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations:

- 1. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
  - 1. Preparation of substrates.
  - 2. Required substrate tolerances.
  - 3. Sequence of installation or erection.
  - 4. Required installation tolerances.
  - 5. Required adjustments.
  - 6. Recommendations for cleaning and protection.
- Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
  - 1. Name, address, and telephone number of factory-authorized service representative making report.
  - 2. Statement on condition of substrates and their acceptability for installation of product.
  - 3. Statement that products at Project site comply with requirements.
  - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - 6. Statement whether conditions, products, and installation will affect warranty.
  - 7. Other required items indicated in individual Specification Sections.
- R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

END OF SECTION



# SUBMITTAL & SHOP DRAWING TRANSMITTAL

# BCSD - FEMA HMGP Phase II - Safe Room

Document Control	Informati	<u>on</u>				
Tt Project No.:	213-207	015-24001				
Client Project No.:	BCSD-S	AFE ROOM 03				
Date Received:						
Contractor:						
Submittal No.:						
Submittal Title:						
	_			_		
		SHOP DRAWING REVIE	ΞW			
	ARCHITECT/ENGINEER'S REVIEW OF THIS SUBMITTAL IS ONLY TO DETERMINE IF THE ITEMS COVERED BY THE SUBMITTAL WILL CONFORM TO THE CONTRACT DOCUMENTS AND BE COMPATIBLE WITH THE DESIGN CONCEPT OF THE COMPLETED PROJECT. ARCHITECT/ENGINEER'S REVIEW DOES NOT EXTEND TO MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES OF CONSTRUCTION OR TO SAFETY PRECAUTIONS OR PROGRAMS INCIDENT THERETO. ARCHITECT/ENGINEER'S REVIEW OF THIS SUBMITTAL DOES NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY FOR ANY VARIATION FROM THE REQUIREMENTS OF THE CONTRACT DOCUMENTS CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS OF THE CONTRACT DOCUMENTS OF THE SPECIFICATIONS FOR MORE DETAIL REGARDING THE CONTRACTOR'S RESPONSIBILITIES FOR SUBMITTALS.					
		NO EXCEPTIONS TAKEN				
		EXCEPTIONS NOTED				
		REVISE & RESUBMIT				
		ACKNOWLEDGE RECEIPT / FOR INFORMATION ONLY				
	_	SEE TRANSMITTAL FOR FURTH	ER CC	)MMENTS		
	BY:	DATE:				
		TETRA TECH, INC.				



To: (Contractor Project Contact Person) Submittal No.:

(Contractor Name) Specification No.:

(Street Address) Vendor/Supplier:

(City, State, Zip)

<u>Sheet No.</u> <u>Description</u> <u>Date</u> <u>Action</u> \*

**Comments:** 

#### SECTION 01 45 23 - TESTING SERVICES

#### PART 1 – GENERAL

#### 1.1 SECTION INCLUDES

- A. Selection and payment.
- B. Contractor submittals.
- C. Testing agency responsibilities.
- D. Testing agency reports.
- E. Limits on testing authority.
- F. Contractor responsibilities.
- G. Schedule of tests.

#### 1.2 RELATED SECTIONS

- A. Testing and approvals required by public authorities.
- B. Section 01 45 00 Quality Control.

#### 1.3 REFERENCES (LATEST REVISION)

- A. ASTM C 802 Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction Materials.
- B. ASTM C 1077 Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- C. ASTM C 1093 Practice for Accreditation of Testing Agencies for Masonry.
- D. ASTM D 3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- E. ASTM D 4561 Practice for Quality Control Systems for Organizations Producing and Applying Bituminous Paving Materials.
- F. ASTM E 329 Specification for Agencies Engaged in Construction Inspection and/or Testing.
- G. ASTM E 543 Practice for Agencies Performing Nondestructive Testing.
- H. ASTM E 548 Guide for General Criteria Used for Evaluating Laboratory Competence.

I. ASTM E 699 – Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

#### 1.4 SELECTION AND PAYMENT

- A. Owner will employ and pay for services of an independent testing agency or laboratory to perform specified testing. Contractor shall pay for all retesting of failed tests.
- B. Employment of testing agency or laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

#### 1.5 QUALITY ASSURANCE

- A. Comply with requirements of practices listed in paragraph 1.3.
- B. Laboratory: Authorized to operate in State in which project is located.
- C. Laboratory Staff: Maintain a full-time registered Engineer on staff to review services.
- D. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

#### 1.6 CONTRACTOR SUBMITTALS

- A. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full-time registered Engineer and responsible officer.
- B. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

#### 1.7 TESTING AGENCY RESPONSIBILITIES

- A. Test samples of mixes submitted by Contractor.
- B. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
- C. Perform specified sampling and testing of products in accordance with specified standards.
- D. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- E. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.
- F. Perform additional tests required by Engineer, at no additional cost to Owner.
- G. Attend preconstruction meetings and progress meetings, as directed by the Engineer, at no additional cost to the Owner.

#### 1.8 TESTING AGENCY REPORTS

- A. After each test, promptly submit three (3) copies of report to Engineer and to Contractor.
- B. Include:
  - 1. Date issued.
  - 2. Project title and number.
  - 3. Name of inspector.
  - 4. Date and time of sampling or inspection.
  - 5. Identification of product and specifications section.
  - 6. Location in the Project.
  - 7. Type of inspection or test.
  - 8. Date of test.
  - 9. Results of tests.
  - 10. Conformance with Contract Documents.
- C. When requested by Engineer, provide interpretation of test results.

#### 1.9 LIMITS ON TESTING AUTHORITY

- A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
- B. Agency or laboratory may not approve or accept any portion of the Work.
- C. Agency or laboratory may not assume any duties of Contractor.
- D. Agency or laboratory has no authority to stop the Work.

#### 1.10 CONTRACTOR RESPONSIBILITIES

- A. Deliver to agency or laboratory at designated location, adequate samples of materials proposed to be used requiring testing, along with proposed mix designs.
- B. Cooperate with laboratory personnel and provide access to the Work and to manufacturer's facilities.
- C. Provide incidental labor and facilities:
  - 1. To provide access to Work to be tested.
  - 2. To obtain and handle samples at the site or at source of products to be tested.
  - 3. To facilitate tests.
  - 4. To provide storage and curing of test samples.
- D. Notify Engineer and laboratory 48 hours prior to expected time for operations requiring testing services.
- E. Employ services of an independent qualified testing laboratory, arrange with laboratory and pay for additional samples and tests required by Contractor beyond specified requirements, at no additional cost to Owner.

#### 1.11 SCHEDULE OF TESTS

Section	Test	Frequency	Date	Performed By	Notes
31 00 00	– Earthwork			<i>,</i>	
	Compaction				
	Unpaved	1 test per horizontal layer			
	1	per 10,000 sf of fill area			
	Paved	1 test per horizontal layer			
		per 5,000 sf of subgrade			
		1 test per horizontal layer			
	Building Pad	per 1,500 sf of fill area			
	Curb & gutter	1 test per 300 lf			
	Proof Rolling	As necessary			
32 11 23	- Aggregate Base	Courses			
	Base Density	1 test per 5,000 sf			
32 12 16		g Binder/Surface courses		· '	
	Asphalt	1 test for each 250 tons			
	Extraction &	placed			
	Gradation				
	Marshall	1 test for each 250 tons			
	Stability	placed			
	Field Density	1 test for each 250 tons			
		placed			
	Cores	1 test for each 250 tons			
		placed			
33 10 00	SC - Water Utilitie	S			
	Hydrostatic &	1.5 times the working			
	Leakage	pressure (no less than 150			
		psi). Conducted for 2			
		hours with maintained			
		pressure of 150 psi (200			
		psi on fire main)			
	Bacteriological	2 taken 24 hours apart			
	Samples	after disinfection			
	Compaction				
	Traffic	1 per 100 lf or less for			
	Areas	each 4 ft. of depth			
	Non-Traffic	1 per 500 lf or less for			
	Areas	each 4 ft. of depth			
	Fire Flow	1 per permit			
33 40 00	- Storm Drainage V	Utilities		·	
	Compaction				
	Traffic Areas	1 per 100 lf or less for			
		each 4 ft. of depth			
	Non-Traffic	1 per 500 lf or less for			
		each 6 ft. of depth			
	Deflection Test	To limit pipe deflection to			
	(Flexible Pipe)	no more than 5%			

Section	Test	Frequency	Date	Performed By	Notes
33 30 00	- Sanitary Sewerag	ge Utilities			
	Leakage	As necessary			
	Compaction				
	Traffic	1 per 100 lf or less for			
	Areas	each 4 ft. of depth			
	Non-Traffic	1 per 500 lf or less for			
	Areas	each 6 ft. of depth			
	Gravity – Air	[ All lines ]			
	Deflection	10% of system			
	Certification	Completion			
	Warranty	Completion			
	Television Inspection of Sewers	As requested			
03 00 00	- Concrete	1			
	Mix Designs	1 per mix design			
	Compressive	3 test cylinders for every			
	Strength	50 cubic yards or less of			
		each mix design placed			
		daily			
		1 cylinder broken at 7 days			
		2 cylinders broken at 28			
		days			
	Slump	1 test for each set of cylinders taken			

STEEL		CONT.	PERIODIC
1.	Material verification of High-strength bolts, nuts and		X
	washers		
2.	High-strength bearing connections		X
3.	Single pass fillet weld less than or equal to 5/16".		X
4.	Floor and Deck welds		X
5.	Installation of open-web steel joists and joist girders.		X
	a. End Connections – welded or bolted		X
	b. Bridging – horizontal or diagonal		X
MASC	NRY	CONT.	PERIODIC
	NRY Verify the proportions of site-mixed mortar and grout.	CONT.	PERIODIC X
	Verify the proportions of site-mixed mortar and grout.	CONT.	
1.	Verify the proportions of site-mixed mortar and grout.	CONT.	X
1.	Verify the proportions of site-mixed mortar and grout.  Verify placement of masonry units and construction of	CONT.	X
1.	Verify the proportions of site-mixed mortar and grout.  Verify placement of masonry units and construction of mortar joints	CONT.	X X
1.	Verify the proportions of site-mixed mortar and grout.  Verify placement of masonry units and construction of mortar joints  Verify placement of reinforcement and connectors		X X
1. 2. 3. 4. 5.	Verify the proportions of site-mixed mortar and grout.  Verify placement of masonry units and construction of mortar joints  Verify placement of reinforcement and connectors  Grout space prior to grouting	X	X X

other details of anchorage of masonry to structural members, frames or other construction.		
8. Verify specified size, grade and type of reinforcement		X
9. Welding of reinforcing bars	X	
10. Protection of masonry during weather temperatures below 40 F or above 90 F		X
11. Preparation of any required grout specimens, mortar specimens and/or prisms.	X	
CONCRETE	CONT.	PERIODIC
1. Reinforcing steel and placement.		X
2. Bolts to be installed in concrete prior to and during placement.	X	
3. Verify use of required design mix.		X
4. Sampling fresh concrete and performing slump, air content and determining the temperature of fresh concrete at the time of making specimens for strength test per ACI 318	X	
5. Concrete Placement	X	
6. Maintenance of specified curing temperatures		X

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01 45 23

#### SECTION 01 91 00 - COMMISSIONING

### PART 1 - GENERAL

## 1.1 SUMMARY

#### A. Section Includes:

- 1. Commissioning description.
- 2. Submittals.
- 3. Qualifications
- 4. Commissioning services.
- 5. Commissioning responsibilities.
- 6. Commissioning meetings.
- 7. Commissioning reports.
- 8. Sequencing.
- 9. Scheduling.
- 10. Maintenance materials.
- 11. Test equipment.
- 12. Verification check and startup procedures.
- 13. Functional performance test procedures.
- 14. Function performance test methods.
- 15. Deficiencies and test approvals.
- 16. Demonstration.

## B. Related Sections:

- 1. Section 23 08 00 Commissioning of HVAC: Mechanical systems commissioning requirements.
- C. Allowances: Include under provisions of Section 01 20 00 Price and Payment Procedures. Allowance includes furnishing Commissioning Authority services.

## 1.2 REFERENCES

- A. Associated Air Balance Council (AABC):
  - 1. AABC Commissioning Guideline.
- B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
  - 1. ASHRAE Guideline 1 The HVAC Commissioning Process.
- C. National Environmental Balancing Bureau (NEBB):
  - 1. NEBB Procedural Standards for Building Systems Commissioning.

#### 1.3 COMMISSIONING DESCRIPTION

A. Commissioning: Systematic process of ensuring systems perform interactively according to design intent and Owner's operational needs. Commissioning process encompasses and coordinates system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training, and verification of actual performance.

## B. Commissioning Intent:

- 1. Verify equipment and systems are installed according to manufacturer's instructions, industry accepted minimum standards, and Contract Documents.
- 2. Verify equipment and systems receive adequate operational checkout by Contractor.
- 3. Verify and document proper performance of equipment and systems.
- 4. Verify complete operation and maintenance documentation is delivered to Owner.
- 5. Verify Owner's operating and maintenance personnel are adequately trained.
- C. Equipment and Systems to Be Commissioned: HVAC, plumbing, electrical, lighting controls, and emergency generator.
- D. Commissioning does not relieve Contractor of responsibility to provide finished and fully functioning Project.
- E. Commissioning Process Overview and General Order of Commissioning Tasks:
  - 1. Commissioning begins with initial commissioning meeting.
  - 2. Conduct progress commissioning meetings throughout construction to plan, scope, coordinate, and schedule future activities and to resolve problems.
  - 3. Equipment documentation is submitted to Commissioning Authority during normal submittals with detailed startup procedures.
  - 4. Commissioning Authority works with Contractor and equipment and system installers to develop startup plans and startup documentation formats, including verification checklists to be completed by installers, during verification check and startup process.
  - 5. In general, checkout and performance verification proceed from simple to complex, that is, from component level to equipment to systems and intersystem levels, with verification checklists being completed before functional testing.
  - 6. Equipment and system installers execute and document verification checklists and perform verification check and startup. Commissioning Authority verifies that checklists and startup were completed according to approved plans.
  - 7. Commissioning Authority develops specific equipment and system functional performance test procedures. Equipment and system installers and Contractor review procedures.
  - 8. Equipment and system installers execute procedures under direction of and documentation by Commissioning Authority.
  - 9. Items of noncompliance in material, installation, or setup are corrected at Contractor's expense, and system is retested.
  - 10. Commissioning Authority reviews operation and maintenance documentation for completeness.
  - 11. Commissioning is completed before Substantial Completion.
  - 12. Commissioning Authority reviews, approves, and coordinates training provided by equipment and system installers and verifies training was completed.
  - 13. Deferred testing is conducted as specified.

#### 1.4 SUBMITTALS

- A. Section 01 33 00 Submittal Procedures and Requirements contains requirements for submittals.
- B. Qualification Data: Submit the following prior to start of Work:
  - 1. Commissioning Authority: Firm name, address, and telephone number, and name of responsible officer.
  - 2. Name of full time individual assigned to Project and assuming role as Commission Authority.
  - 3. Detailed description of three commissioning projects completed by full time individual assigned to Project within past five years. Include names and telephone numbers of owner's project manager and Contractor's Site superintendent.

#### 1.5 COMMISSIONING SUBMITTALS

- A. Furnish one copy of Contract Documents including Addenda, Change Orders, requests for interpretation, and meeting minutes, to Commissioning Authority.
- B. Furnish one copy of submittals directly to Commissioning Authority for review and approval according to procedures specified in Section 01 33 00 Submittal Procedures and requirements.
  - 1. Make submittals for each piece of equipment or system indicated to be commissioned.
  - 2. Make submittals to Commissioning Authority concurrent with submittals to Architect/Engineer.
  - 3. Distribute one copy of approved submittals to Commissioning Authority.
- C. Furnish one copy of preliminary operation and maintenance data manuals to Commissioning Authority for each piece of equipment or system indicated to be commissioned.
  - 1. Submit required manuals within 30 days after submittals for each piece of equipment or system required under Section 01 33 00 Submittal Procedures are approved.
- D. Make additional submittals requested by Commissioning Authority for each piece of equipment or system indicated to be commissioned. Incorporate requested submittal information into related operation and maintenance manuals. Include the following:
  - 1. Manufacturer's printed, detailed installation and startup, operating, troubleshooting, and maintenance procedures.
  - 2. Equipment performance curves.
  - 3. Factory test reports.
  - 4. Full sequence of operation and control diagrams.
  - 5. Proposed testing, adjusting, and balancing procedures.
  - 6. Complete warranty information, identifying Owner responsibilities to keep warranty in force.
  - 7. Lists of installation and checkout materials shipped with equipment.
  - 8. Manufacturer's field checkout forms to be used by factory or field technicians.
  - 9. Other documentation necessary for commissioning process.

- E. Furnish one copy of verification check and startup plan to Commissioning Authority for review and approval. Include the following at minimum:
  - 1. Commissioning Authority's verification checklists with party responsible for each item indicated
  - 2. Manufacturer's standard startup procedures copied from installation manuals.
  - 3. Manufacturer's standard field checkout sheets.
  - 4. Supplemental procedures and checklists prepared by equipment and system installers to accommodate Project conditions.
  - 5. Sensor and actuator calibration procedures.
  - 6. Include boxes or lines for recording and documenting checking and inspections of each procedure and summary statement with signature block at end of plan.
- F. Submit written training plan to Commissioning Authority for review and approval prior to conducting training including the following:
  - 1. Equipment included in training session.
  - 2. Intended audience.
  - 3. Location of training.
  - 4. Objectives.
  - 5. Subjects covered.
  - 6. Duration of training on each subject.
  - 7. Instructor for each subject.
  - 8. Instructional methods to be used.
- G. Commissioning Authority will review and approve submittals for conformance to Contract Documents as related to commissioning process, for primary purpose of aiding development of functional testing procedures and secondary purpose of verifying compliance with equipment Specifications.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Section 01 77 00 Closeout Procedures contains requirements for closeout submittals.
- B. Operation and Maintenance Data: Submit operation and maintenance manuals as specified in individual equipment and system Specifications.
  - 1. Submittals made to Commissioning Authority do not constitute compliance with operation and maintenance manual documentation.
- C. Commissioning Record: Commissioning Authority will submit one copy of commissioning record for inclusion in operation and maintenance manuals. Furnish records in following format, arranged by system, with each part separated by tabbed flyleafs:
  - 1. Commissioning plan.
  - 2. Final commissioning report.
  - 3. System 1: Provide the following separated by tabbed flyleafs:
    - a. Design narrative and criteria, sequences, and approvals.

- b. Startup plan and report, approvals, corrections, and blank verification checklists. Separate data for each equipment type with colored separators.
- c. Completed, functional tests, trending and analysis, approvals and corrections, training plan, record and approvals, blank functional test forms, and recommended re-commissioning schedule.
- 4. System 2: As specified for System 1.
- D. Final Commissioning Report: Commissioning Authority will submit one copy of final commissioning report including the following:
  - 1. Executive summary with list and roles of participants, brief Project description, overview of commissioning and testing scope, and general description of testing and verification methods.
  - 2. For Each Piece of Commissioned Equipment: Include statement regarding compliance with Contract Documents in the following areas:
    - a. Equipment Specifications.
    - b. Equipment installation.
    - c. Functional performance and efficiency.
    - d. Equipment documentation and design intent.
    - e. Operator training.
  - 3. Include recommendations for improvement to equipment or operations, future actions, and commissioning process changes.
  - 4. List outstanding deficiencies referenced to specific functional test, inspection, trend log, or other record where deficiency is documented.
  - 5. Include brief description of verification method used as well as observations and conclusions from testing for each commissioned piece of equipment and system.

## 1.7 QUALITY ASSURANCE

- A. Perform Work according to AABC.
- B. Perform Work according to State standard.
- C. Maintain one copy of each document on Site.

#### 1.8 QUALIFICATIONS

- A. Commissioning Authority Firm: Company specializing in performing Work of this Section with minimum 5 years documented experience.
  - 1. Responsible for successfully commissioning 5 facilities of similar complexity and systems in past five years.
  - 2. Independent of Owner, Architect/Engineer, and Contractor.
- B. Commissioning Authority: Individual employed by Commissioning Authority firm specializing in performing Work of this Section with minimum 5 years documented experience.

- 1. Licensed as Professional Engineer in same state as Site, with mechanical and electrical engineering specialty.
- 2. Experienced in operation and troubleshooting mechanical and electrical systems, energy management control systems, and lighting control systems.
- 3. Knowledgeable in test and balance of air and water systems.
- 4. Experienced in monitoring and analyzing system operation using energy management control system trending or standalone data-logging equipment.
- 5. Excellent verbal and written communication skills, highly organized, and able to work with both management and installers.

#### 1.9 COMMISSIONING SERVICES

A. Employ and pay for services of an independent firm as Commissioning Authority acceptable to Owner to perform specified commissioning.

## 1.10 COMMISSIONING RESPONSIBILITIES

- A. Responsibilities indicated for Owner, Architect/Engineer, and Commissioning Authority are provided only to clarify commissioning process.
- B. Architect/Engineer Responsibilities:
  - 1. Perform Site observation of each system immediately before system startup.
  - 2. Furnish design narratives and sequence documentation requested by Commissioning Authority.
  - 3. Clarify operation and control of commissioned equipment when Specifications, control drawings, or equipment documentation is not sufficient for writing detailed testing procedures.
  - 4. Coordinate resolution of design issues affecting system performance identified during commissioning.
  - 5. Coordinate resolution of system deficiencies identified during commissioning, according to Contract Documents.
  - 6. Prepare and submit final design intent documentation reflecting installed conditions for inclusion in operation and maintenance manuals.
  - 7. Review and approve operation and maintenance manuals.
  - 8. Make presentation at one training session for Owner's personnel.
  - 9. [Approve verification checklists for major pieces of equipment.
  - 10. Approve functional test procedure forms for major pieces of equipment.

## C. Commissioning Authority Responsibilities:

- 1. Basic Responsibilities:
  - a. Coordinate, direct, and approve commissioning Work.
  - b. Develop and coordinate execution of commissioning plan. Revise commissioning plan to suit Project conditions.
  - c. Schedule commissioning Work with Contractor for inclusion in Progress Schedule.
  - d. Plan and conduct commissioning meetings.

- e. Request and review commissioning submittals required to perform commissioning tasks.
- f. Write and distribute verification tests and checklists.
- g. Develop verification check and startup plan in cooperation with Contractor and equipment and system installers.
- h. Write functional performance test procedures in cooperation with Contractor and equipment and system installers.
- i. Review test and balance execution plan.
- j. Attend Project progress and pre-installation meetings. Review meeting minutes. Resolve potential conflicts with commissioning activities.
- k. Observe equipment and system installations.
- l. Document that equipment and systems are installed and perform according to design intent and Contract Documents.
- m. Notify Owner of deficiencies.
- n. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
- o. Oversee and approve content and adequacy of Owner's personnel training.
- p. Review and approve operation and maintenance manuals.
- q. Compile commissioning record and testing data manual.
- r. Provide final commissioning report.

## 2. Detailed Responsibilities:

- a. Witness and document each piping, ductwork, and electrical system testing, cleaning, and flushing. Include documentation in operation and maintenance manuals.
- b. Approve verification tests and checklist completion by reviewing verification checklist reports, Site observation, and spot checking.
- c. Approve system startup by reviewing startup reports and Site observation.
- d. Oversee functional testing of control system. Approve control system for use for test and balance operations.
- e. Approve air and water system balancing by reviewing completed reports, Site observation, and spot testing.
- f. Analyze functional performance trend logs and monitor data to verify performance.
- g. Coordinate, witness, and approve manual functional performance tests performed by equipment and system installers.
  - 1) Coordinate retesting until satisfactory performance is achieved.
  - 2) Perform actual functional testing on equipment as specified in Section 23 08 00 Commissioning of HVAC.
- h. Maintain deficiency and resolution log and separate testing record. Submit progress reports and test results with recommended actions to Owner.
- i. Review documentation for factory and performance tests that Commissioning Authority does not oversee. Determine what additional testing and documentation is required to comply with Contract Documents.
- j. Review equipment warranties to ensure Owner's responsibilities are defined.
- k. Return to Site minimum of two months before expiration of warranty period.

- 1) Review with Owner's personnel the current equipment and system operation and condition of outstanding issues related to original and seasonal commissioning.
- 2) Interview Owner's personnel to identify problems or concerns regarding equipment and system operation.
- 3) Make suggestions for improvements and for recording changes in operation and maintenance manuals.
- 4) Identify deficiencies covered by warranty or original construction contract.
- 5) Assist Owner's personnel to develop reports, documents, and requests for services to remedy outstanding problems.
- 1. Develop systems manual according to AABC.
- m. Prepare standard trend logging package of primary parameters, providing operations staff clear indications of system function to identify proper system operation and troubleshoot problems. Include information required to interpret trends.
- n. Assist in developing preventative maintenance plan, detailed operating plan, energy and resource management plan, and record documents.

## 3. Commissioning Authority may not:

- a. Release, revoke, alter, or enlarge on requirements of Contract Documents.
- b. Approve or accept any portion of the Work.
- c. Assume duties of Contractor or Architect/Engineer.
- d. Stop the Work.

## D. Owner Responsibilities:

- 1. Arrange for Owner's personnel to attend commissioning activities and training sessions according to commissioning plan.
- 2. Approve commissioning Work completion.
- 3. Ensure seasonal or deferred testing and deficiency issues are addressed.

## E. Contractor Responsibilities:

- 1. Include requirements for commissioning submittal data, operation and maintenance data, commissioning tasks and training in each purchase order and subcontract for equipment and systems indicated to be commissioned.
- 2. Facilitate coordination of commissioning Work by Commissioning Authority.
- 3. Attend commissioning meetings.
- 4. Cooperate with Commissioning Authority and provide access to the Work and to manufacturers' facilities.
- 5. Require equipment and system installers to execute test to review and provide comments on functional test procedures.
- 6. Require manufacturers to review commissioning test procedures for equipment installed by manufacturer.
- 7. Furnish proprietary test equipment required by manufacturers to complete equipment and system tests.
- 8. Provide temporary facilities as specified in Section 01 50 00 Temporary Facilities and Controls for Commissioning Authority's exclusive use for documentation and instrument storage and preparation of reports.

- 9. Furnish qualified personnel to assist in completing commissioning.
- 10. Furnish manufacturer's qualified field representatives as specified in Section 01 40 00 Quality Requirements and individual Specification Sections to assist in completing commissioning.
- 11. Ensure equipment and system installers execute commissioning responsibilities according to Contract Documents and Progress Schedule.
- 12. Coordinate Owner's personnel training.
- 13. Prepare operation and maintenance manuals specified in Section 01 70 00 Execution and Closeout Requirements. Update original sequences of operation reflecting actual installation.
- 14. Ensure equipment and system installers execute seasonal and deferred functional performance testing, witnessed by Commissioning Authority.
- 15. Ensure equipment and system installers correct deficiencies and make necessary adjustments to operation and maintenance manuals and record documents for issues identified in seasonal testing.

## 1.11 COMMISSIONING MEETINGS

- A. Commissioning Authority will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- B. Initial Commissioning Meeting:
  - 1. Commissioning Authority will schedule meeting within 60 days after Notice of Award.
  - 2. Attendance Required: Commissioning Authority, Owner, Owner's facility operating personnel, Architect/Engineer, Contractor, Subcontractors, and testing, adjusting, and balancing agency. Require attendance by installers of the following equipment and systems indicated to be commissioned, including:
    - a. Mechanical equipment and systems.
    - b. Plumbing equipment and systems.
    - c. Electrical equipment and systems.
    - d. Temperature control equipment and systems.

## 3. Agenda:

- a. Designation of personnel representing parties for commissioning activities.
- b. Review commissioning process and responsibilities.
- c. Review commissioning plan development procedures.
- d. Review required commissioning submittals.
- e. Present initial commissioning schedule.

## C. Progress Commissioning Meetings:

- 1. Commissioning Authority will schedule meetings throughout progress of the Work at maximum monthly intervals.
  - a. Beginning three months before Substantial Completion, meetings will be scheduled at maximum weekly intervals.

- 2. Attendance Required: As specified for initial commissioning meeting.
- 3. Agenda:
  - a. Coordination of commissioning activities.
  - b. Commissioning deficiency resolution.
  - c. Commissioning schedule.
  - d. Planning for future commissioning activities.
- D. Commissioning Authority will record meeting minutes and distribute copies within two days after meeting to participants and those affected by decisions made.

#### 1.12 COMMISSIONING REPORTS

- A. Commissioning Authority Reports: Submit reports regularly to Owner, Architect/Engineer, and Contractor. Include the following.
  - 1. Progress reports.
  - 2. Scheduling changes.
  - 3. Observation reports of specific commissioning activities.
  - 4. Testing progress and approvals.
  - 5. Deficiencies and deficiency resolution reports.
- B. Commissioning Authority Functional Performance Test Procedures: Develop test procedures including forms with following information. Include completed documentation in operation and maintenance manuals.
  - 1. System and equipment or component names.
  - 2. Equipment location and identification number.
  - 3. Unique test identification number and reference to unique verification checklist and startup documentation identification numbers for piece of equipment.
  - 4. Date.
  - 5. Project name.
  - 6. Participating parties.
  - 7. Copy of Specification Section describing test requirements.
  - 8. Copy of specific sequence of operations or other specified parameters being verified.
  - 9. Formulas used in calculations.
  - 10. Required pre-test field measurements.
  - 11. Instructions for setting up test.
  - 12. Special cautions, alarm limits, and safety concerns.
  - 13. Specific step-by-step procedures to execute test, in clear, sequential, and repeatable format.
  - 14. Acceptance criteria of proper performance with "Yes/No" check box to allow for marking whether or not proper performance of each part of test was achieved.
  - 15. Section for comments.
  - 16. Signatures and date block for Commissioning Authority.

#### 1.13 SEQUENCING

A. Section 01 10 00 - Summary contains requirements for sequencing.

- B. Sequence Work to complete commissioning, except for functional testing and Owner's personnel training, before Substantial Completion.
- C. Sequence Work to achieve functional completion before final completion. Complete the following for each piece of equipment and system indicated to be commissioned to achieve functional completion:
  - 1. Complete and sign startup and verification checklist documentation.
  - 2. Submit trend log data.
  - 3. Submit final approved test and balance report.
  - 4. Complete functional testing.
  - 5. Complete training of Owner personnel.
  - 6. Submit approved operation and maintenance data manuals.
  - 7. Correct identified deficiencies or obtain approval by Owner to exclude deficiencies from functional completion.
- D. For equipment or systems requiring seasonal operation, perform commissioning for other season within six months of Substantial Completion.
- E. For equipment or systems where commissioning is delayed by Owner occupancy requirements or unforeseen conditions, perform commissioning as specified for seasonal operation equipment.

#### 1.14 SCHEDULING

- A. Schedule Work to allow adequate time for commissioning activities.
- B. Identify commissioning milestones, activities, and durations on Progress Schedule.
  - 1. Identify the following for each piece of equipment and system including:
    - a. Operation and maintenance manual submittal.
    - b. Verification check and startup.
    - c. Functional performance test.
    - d. Functional completion.
    - e. Demonstration and training sessions.
    - f. Commissioning completion.

#### 1.15 MAINTENANCE MATERIALS

- A. Section 01 78 23 Operation and Maintenance Data contains requirements for maintenance materials.
- B. Furnish one set of manufacturer's proprietary test equipment, tools, and instruments required to complete commissioning.
  - 1. Deliver test equipment to Owner after completion of functional performance test. Obtain signed receipt.

#### PART 2 - PRODUCTS

## 2.1 TEST EQUIPMENT

- A. Testing Equipment: Calibrated within last year; of sufficient quality and accuracy to test and measure system performance within the following tolerances unless otherwise specified for individual equipment or systems.
  - 1. Temperature Sensors and Digital Thermometers: 0.5 degrees F accuracy and plus or minus 0.1 degrees F resolution.
  - 2. Pressure Sensors: Accuracy of plus or minus 2.0 percent of measured value range.
- B. Recalibrate test equipment according to manufacturer's recommended intervals and when dropped or damaged.
  - 1. Affix calibration tags to test equipment or furnish certificates upon request.
- C. Equipment Furnished by Contractor and Remaining Property of Contractor:
  - 1. Standard testing equipment required to perform verification check and startup and required functional performance testing.
  - 2. Two-way radios for personnel performing commissioning.
- D. Equipment furnished by Commissioning Authority and remaining property of Commissioning Authority:
  - 1. Data-logging equipment and software.

#### **PART 3 - EXECUTION**

## 3.1 EXAMINATION

- A. Verify equipment and systems are installed according to individual Specification Sections.
- B. Verify utility and power connections are complete and services operational.

## 3.2 VERIFICATION CHECK AND STARTUP PROCEDURES

- A. Notify Commissioning Authority and schedule verification check and startup activities with each party required to complete verification check and startup a minimum of four weeks in advance.
- B. Allow Commissioning Authority to witness verification check and startup.
  - 1. Primary Equipment: Commissioning Authority will witness procedures for each piece of equipment. For multiple units, Commissioning Authority will witness procedures on 20 percent, but not less than four, of each type unit.

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2. Secondary Equipment: Commissioning Authority will witness sampling of each type unit as specified in commissioning plan.

## C. Verification Check and Startup:

- 1. Perform verification check and startup according to approved verification check and startup plan.
- 2. Complete entire plan for each piece of equipment or system indicated to be commissioned.
- 3. Complete each procedure in sequence performed by party assigned to each procedure.
- 4. Record completion of each procedure. Indicate results of procedure where required. Sign and date plan by individual performing procedure.
- 5. Identify items not completed successfully.
- 6. Sign and date plan indicating completion of entire plan.
- 7. Submit executed plan to Commissioning Authority within two days of completion.

## D. Deficiencies and Approvals:

- 1. Commissioning Authority will review verification check and startup reports and issue deficiency report or approval.
- 2. Correct deficiencies and resubmit updated verification check and startup report with statement indicating corrections made for Commissioning Authority approval.
- 3. Repeat process until verification check and startup report are approved.
- 4. Costs for incomplete verification check and startup items that later cause deficiencies or delays during functional tests will be charged to party responsible for incomplete item.

## 3.3 FUNCTIONAL PERFORMANCE TEST PROCEDURES

- A. Complete the following before performing functional tests:
  - 1. Verification check and startup.
  - 2. Control system testing with approval by Commissioning Authority for use for test and balance operations.
  - 3. Air system balancing and water system balancing.
- B. Notify Commissioning Authority of completion of verification check and startup activities.
- C. Commissioning Authority will direct, witness, and document results of functional performance tests.
- D. Conduct functional performance tests as specified in Section 23 08 00 Commissioning of HVAC.
- E. Demonstrate that each piece of equipment and system is operating according to documented design intent and Contract Documents.
  - 1. Conduct testing proceeding from components, to subsystems, to systems.
  - 2. Bring equipment and systems to condition capable full dynamic operation.
  - 3. Verify performance of individual components and systems.
  - 4. Verify performance of interactions between systems.

- 5. Identify and correct areas of deficient performance.
- F. Operate each piece of equipment and system through each specified mode of operation including seasonal, occupied, unoccupied, warmup, cool-down, partial load, and full load conditions.
  - 1. Verify each sequence in sequences of operation.
  - 2. Test for proper responses to power failure, freezing, overheating, low oil pressure, no flow, equipment failure, and other abnormal conditions.

#### 3.4 FUNCTIONAL PERFORMANCE TEST METHODS

- A. Perform testing and verification by using manual testing or by monitoring performance and analyzing results using control system trend log capabilities or by standalone data loggers as specified for each piece of equipment or system.
  - 1. Commissioning Authority may require alternate or additional method other than specified method.
  - 2. Commissioning Authority will determine test method when method is not specified.
- B. Simulated Conditions: Simulating conditions, not by overwritten values, is permitted. Timing tests to use real conditions is encouraged wherever practical.
- C. Overwritten Values: Overwriting sensor values to simulate conditions may be used with caution and avoided when possible.
- D. Simulated Signals: Using signal generator to create simulated signals to test and calibrate transducers automatic temperature controls is generally recommended over using sensors as signal generators with simulated conditions or overwritten values.
- E. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test specific sequence is acceptable. Reset setpoint after completing test.
- F. Indirect Indicators: Using indirect indicators for responses or performance is permitted only after visually and directly verifying and documenting indirect readings through control system representing actual conditions and responses over tested parameter range.
- G. Perform each function and test under conditions simulating actual conditions as close as is practically possible.
  - 1. Provide materials, system modifications, and other items or steps necessary to produce flows, pressures, temperatures, and other responses to execute test according to specified conditions.
  - 2. At completion of test, return modified equipment and systems to pretest condition.
- H. Sampling:

- 1. Multiple identical pieces of equipment or equipment with only small size or capacity differences may be functionally tested using sampling strategy when permitted by other Section according to following rules:
  - a. xx is defined as percentage of group of identical equipment included in each sample.
  - b. yy is defined as percentage of sample failing that will require another sample to be tested.
  - c. First Sample: Randomly test at least xx percent, but at least three, of each group of identical equipment.
  - d. Second Sample: If yy percent of units in first sample fail, test another xx percent of group.
  - e. If yy percent of units in second sample fail, test remaining units in group.
- 2. Do not use sampling strategy for equipment with significant differences in application or sequence of operation differences.
- 3. Refer to Section 23 08 00 Commissioning of HVAC for equipment sampling and failure rates.
- 4. If frequent failures occur, Commissioning Authority may stop testing and require responsible party to perform and document checkout of remaining units, prior to continuing with functional performance testing.

## 3.5 DEFICIENCIES AND TEST APPROVALS

#### A. Deficiencies:

- 1. Commissioning Authority will record and report deficiencies to Owner.
- 2. Minor deficiencies may be corrected during tests at Commissioning Authority's discretion. Deficiency and resolution will be documented on procedure form.
- 3. Failure to attend scheduled verification check, startup, or functional performance test will be considered deficiency.
- 4. When deficiency is identified, Commissioning Authority will discuss issue with party executing test.
  - a. When party executing test accepts responsibility to correct deficiency:
    - 1) Commissioning Authority documents deficiency and executing party's response.
    - 2) Commissioning Authority submits deficiency report to Owner, Contractor, and party executing test.
    - 3) Party executing test corrects deficiency, signs statement of correction on deficiency form certifying equipment is ready for retesting and submits form to Commissioning Authority.
    - 4) Commissioning Authority reschedules test, and test is repeated until satisfactory performance is achieved.
  - b. When party executing test disputes deficiency or responsibility for deficiency:
    - 1) Commissioning Authority documents deficiency and executing party's response.

- 2) Commissioning Authority submits deficiency report to Owner, Contractor, party executing test, and party believed to be responsible for deficiency.
- 3) Commissioning Authority negotiates resolution with parties involved and refers continuing disputes to Architect/Engineer for resolution according to Contract Documents.
- 4) Commissioning Authority documents resolution process.
- 5) When resolution is decided, appropriate party corrects deficiency, signs statement of correction on deficiency form certifying equipment is ready for retesting and submits form to Commissioning Authority.
- 6) Commissioning Authority reschedules test, and test is repeated until satisfactory performance is achieved.

## B. Retesting Costs:

- 1. When verification check and startup or functional performance test deficiency is discovered requiring rescheduling or retesting:
  - a. Owner will compensate Commissioning Authority, Architect/Engineer, and for attending and directing additional testing.
  - b. Owner will deduct additional testing compensation from final payment due to Contractor.
- C. Provide written report to Commissioning Authority before each scheduled commissioning meeting concerning status of each deficiency. Include explanations of disagreements with resolution proposals for each discrepancy.
  - 1. Commissioning Authority will retain original deficiency forms until end of Project.
- D. Manufacturing Defects: When ten percent but not less than three identical pieces of equipment or equipment with only small size or capacity differences fail to perform to Contract Document requirements due to manufacturing defect, all identical units may be considered defective by Owner.
  - 1. Within one week of notice from Owner, examine all other identical units and record findings. Submit findings to Owner within two weeks of original notice.
  - 2. Within two weeks of original notification, provide signed and dated written explanation of problem, cause of defect, and proposed solutions meeting Contract Document requirements. Include equipment submittals supporting solution.
  - 3. Owner will determine whether replacement or repair of all identical units is required.
  - 4. Install two examples of proposed solution. Owner will test installations for up to one week before deciding solution is acceptable.
  - 5. Upon acceptance, replace or repair all identical items, at Contractor's expense. Extend warranty accordingly, when original equipment warranty had begun.
  - 6. Complete repairs or replacements with reasonable speed beginning within one week from when parts can be obtained.
- E. Test Approval: Commissioning Authority notes each satisfactorily demonstrated function on functional performance test form.
  - 1. Commissioning Authority recommends acceptance of each test to Owner using standard form.

2. Owner gives final approval for each test using same form, providing signed copy to Commissioning Authority and Contractor.

#### 3.6 DEMONSTRATION

- A. Section 01 77 00 Closeout Procedures contains requirements for demonstration and training.
- B. Demonstrate equipment and systems and train Owner's personnel as specified in individual equipment and system Specifications.
  - 1. Commissioning Authority will interview Owner's personnel to determine special needs and areas where training will be most valuable.
  - 2. Owner and Commissioning Authority will determine type and extent of training for each commissioned piece of equipment and system.
  - 3. Commissioning Authority will communicate training requirements to Contractor for benefit of equipment and system installers and manufacturers with training responsibilities.
- C. Commissioning Authority will develop criteria for determining training was satisfactorily completed, including attending some training sessions.
  - 1. Commissioning Authority will make recommendation to Owner regarding approval of training.
- D. Initial Mechanical, Electrical, and Plumbing Equipment Training Session:
  - 1. Contractor will make four hour long presentation of overall system design concept and design concept of each equipment section.
  - 2. Presentation will include review of the following systems using simplified system schematics:
    - a. HVAC system.
    - b. Electrical system.
    - c. Plumbing system.
- E. For primary mechanical, electrical, and plumbing equipment training:
  - 1. Require controls contractor to provide short discussion of equipment control as part of training session.
- F. At one training session, Commissioning Authority will make two hour-long presentation discussing use of blank functional test forms for re-commissioning equipment.
- G. Commissioning Authority will make video recording of training sessions, catalog recordings, and furnish one set of recordings for inclusion with operation and maintenance manuals.

END OF SECTION 01 91 00

#### SECTION 02 30 00 - SUBSURFACE INVESTIGATION

#### PART 1 – GENERAL

#### 1.1 DESCRIPTION

A. This section includes subsurface data logs for information only.

## 1.2 SOIL INVESTIGATION DATA

- A. Subsurface data logs are available for information only. Actual conditions may vary. If bidders are not satisfied with accuracy and completeness of all available data, they are at liberty to make borings or perform soil investigation work for their own use at its expense. If Contractor chooses to perform their own investigation, work shall be coordinated with the Engineer. Any results from Contractor's investigation shall be shared promptly with the Engineer. Owner reserves the right to share Contractor's investigation data with other potential bidders if information could affect bidding process.
- B. The boring logs and test results are for information of the Contractor. Owner and Engineer assume no responsibility for the information.

## PART 2 – PRODUCTS

A. See attached report.

PART 3 – EXECUTION (NOT USED)

END OF SECTION



# Barnwell High School Safe Room Barnwell, SC

March 16, 2021 Terracon Project No. 73205002

## **Prepared for:**

Thomas & Hutton Columbia, SC

## Prepared by:

Terracon Consultants, Inc. Columbia, SC

Environmental Facilities Geotechnical Materials

March 16, 2021

Thomas & Hutton 1501 Main Street, Suite 760 Columbia, SC 29201

Attn: Mr. Mark Desouza, P.E.

P: 803-451-6796

E: desouza.m@tandh.com

Re: Geotechnical Engineering Report

Barnwell High School Safe Room

474 Jackson Street

Barnwell, SC

Terracon Project No. 73205002

Dear Mr. Desouza:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. P73205002, dated January 6, 2021, as authorized on January 26, 2021 by Mr. Sanderson. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

**Terracon Consultants, Inc.** 

Ali Soleimanbeigi, P.E. Senior Staff Engineer SC Registration No. 38635 Phillip A. Morrison, P.E. Geotechnical Department Manager SC Registration No. 17275

lerracon

GeoReport.

Terracon Consultants, Inc. 521 Clemson Road Columbia, SC 29229 P (803) 741 9000 F (803) 741 9900 terracon.com

Environmental

**Facilities** 

Geotechnical

Materials

## **REPORT TOPICS**

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**Note:** This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the **GeoReport** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

## **ATTACHMENTS**

EXPLORATION AND TESTING PROCEDURES SITE LOCATION AND EXPLORATION PLANS EXPLORATION RESULTS
SUPPORTING INFORMATION

Note: Refer to each individual Attachment for a listing of contents.

Barnwell High School Safe Room Barnwell, SC March 16, 2021 Terracon Project No. 73205002



## **REPORT SUMMARY**

Tonia 1	Overview Statement <sup>2</sup>		
Topic <sup>1</sup>			
Project Description	The project includes a dome-shaped safe room building housing the gymnasium. Also planned are an emergency generator building, and parking areas and drives. The provided maximum structural loads include:  Safe Room Building: 10 klf for walls and 125 psf for concrete floors  Generator Building: 20 kips for columns, 3 klf for walls, and 125 psf for concrete floors.  Up to 2 feet of fills/cuts are anticipated to achieve the subgrade level in the building and pavement areas. The invert depth of the planned detention pond on the west side of the site will be up to 5 feet below the existing ground surface.  We understand that the drive from Owens Street to Jackson Street along with a small parking area will be constructed in the initial construction phase. The 290-space parking area will be a later addition. Mr. Desouza indicated that the planned pavements will receive only passenger vehicle traffic.		
Geotechnical Characterization	The typical site soil profile consists of loose to medium dense clayey sands underlain by stiff to very stiff sandy fat clays to the explored depths of up to 50 feet. The surficial site soils are significantly wet of their optimum moisture.  Very loose clayey sands were encountered within the upper 6 feet of Boring B-4 and B-4A (the dome building area). Soft sandy clays were encountered to depth of 8 feet bgs in Boring B-7 (detention pond area). It appears these borings are located in a drainage feature, filled as part of the original construction.  Groundwater was encountered at depths of between 1 and 10 feet below ground surface during exploration. Considering the soil profile and the precipitation which occurred both prior and during the field exploration, the shallowest water levels may be at least partially associated with a perched water condition.		
Earthwork	The materials in the area of Borings B-4 and B-7 should be undercut and replaced. As groundwater is relatively shallow and soils are wet, restoring the area will require backfill using an open-graded stone or very coarse, well graded sand. To stabilize the general subgrade soils, remedial measures including surficial reworking or undercutting/replacement with compacted structural fill are expected. The excavated silty/clayey sands can be used as structural fills if dried to a range close to the optimum moisture content.  If the groundwater conditions at the time of construction are as now, excavation for foundation and utility installation will likely require groundwater control measures.		
Shallow Foundations	Shallow foundations will be sufficient to support the building loads.  Allowable bearing pressure = 2,500 psf  Expected settlements: < 1-inch total, < ½-inch differential  Detect and undercut zones of very loose soils as noted in Earthwork.		
Seismic Site Class	Based on the IBC building code and our geophysical data, a seismic site class of D can be used for the design. Based on the results of our liquefaction analysis, the soil profile is not expected to liquefy under the design PGA.		

Barnwell High School Safe Room Barnwell, SC March 16, 2021 Terracon Project No. 73205002



Topic <sup>1</sup>	Overview Statement <sup>2</sup>
Pavements	With the subgrade prepared as noted in <b>Earthwork</b> considering a light-duty traffic, a pavement section consisting of 2 inches Asphaltic Concrete (AC) over 8 inches granular base can be used in drive and parking spaces.
General	This section contains important information about the limitations of this geotechnical
Comments	engineering report.

- 1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
- 2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

# Barnwell High School Safe Room 474 Jackson Street Barnwell, SC Terracon Project No. 73205002 March 16, 2021

## INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed Safe Room to be constructed at the Barnwell High School located at 474 Jackson Street in Barnwell, SC. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Excavation considerations

- Floor slab design and construction
- Seismic site classification per IBC
- Foundation design and construction
- Pavement design and construction

The geotechnical engineering scope of services for this project included the advancement of 11 test borings to depths ranging from approximately 5 to 50 feet below existing site grades (bgs) and geophysical testing to develop the shear wave velocity profile. Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan**, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and as separate graphs in the **Exploration Results** section.

## SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description	
Parcel Information	The project site is located on the Barnwell High School campus at 474 Jackson Street in Barnwell, SC. For additional location information see Site Location.	
Existing Improvements	The proposed project will be located in the space currently occupied by the existing track and field area.	
Current Ground Cover	Except for the asphalt-paved areas (running track), the site vegetation is grass.	

Barnwell High School Safe Room Barnwell, SC March 16, 2021 Terracon Project No. 73205002



Item	Description
Existing Topography	From the provided topographic plan, the ground surface in the area of the track and field is between Elevations 190 and 192 feet amsl. The topography slopes down to 187 feet amsl on the west and north sides of the track toward the roadways. It slopes up to 200 feet amsl on the east and south sides toward the school building and football stadium. Within the general construction area, the current ground surface slopes from 5(H):1(V) to 3(H):1(V).
Additional Observations	There are ditches both on the inside and outside of the track on its east and south sides. The ditches are drained into the storm drain that runs across the site. At the time of our exploration, the ditches did not contain any standing water but were wet.
	Transverse cracks were observed on the asphalt pavement of the running track. These are likely associated with the age of the pavement.
Historical Data	A review of the historical aerial photographs indicates that prior to the existing development, there was a drainage feature that extended across the track and field site in the vicinity of Borings B-4/B-4A and B-7. The extension of the drainage feature is present on the west side of the Jackson Street, extending towards the wooded area further west.
Geology	The site is located in the upper Coastal Plain physiographic province of South Carolina, very near the Fall Line (the transition from the Coastal Plain to the Piedmont province). The Coastal Plain is a wedge-shaped cross section of water and wind deposited soil. Its thickness ranges from a featheredge at the surface contact of the Piedmont to several thousand feet at the present-day coastline. The sediments range in age from the Cretaceous and Tertiary periods at the contact with the bedrock to the Recent period at the present coastline. The sediments include clays, silts, sands, and gravels, as well as organics.

## **PROJECT DESCRIPTION**

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description	
Information Brazila d	Site / Civil Professional Services request for Barnwell High School Safe Room by Tetra-Tech	
Information Provided	Barnwell County Safe Room - Existing Site	
	Boring Map on Site Plan	

Barnwell High School Safe Room Barnwell, SC March 16, 2021 Terracon Project No. 73205002



Item	Description	
Project Description	The new building consists of a dome-shaped safe room with projecting entry vestibule that will house a gymnasium for the high school, while serving as a safe room during emergencies. The building will be located in the north portion of the current track and field area. In addition to the safe room building, there will be a separate building to house the emergency generator. Also planned are a drive extending from Owens Street to Jackson Street and a 290-space parking lot.	
Proposed Structures	The project includes a dome-shaped safe room with projecting entry vestibule. The dome section will have a 164-foot diameter. A separate building to house the emergency generator is also planned.	
Building Construction	The dome building will be hemispherically-shaped, load-bearing concrete dome clearing the gymnasium area.  The generator building will be steel framed structure with a masonry exterior.  Both buildings will have concrete slabs-on-grade.	
Finished Floor Elevation	Not provided. We assume it will be raised slightly higher than the existing ground surface to help improve drainage around the building areas.	
Maximum Loads	The following information was provided by the structural engineer.  Safe Room Building:  Walls: 10 kips per linear foot (klf) at the dome perimeter  Slabs: 125 pounds per square foot (psf)  Generator Building:  Columns: 20 kips  Walls: 3 kips per linear foot (klf)  Slabs: 125 pounds per square foot (psf)	
Grading/Slopes	The final grades are not provided. Given the relatively flat topography of the proposed construction area, we assume that up to 2 feet of new fill will be placed to improve the drainage of the site.  The ½-acre detention pond will be located along the west side of the site. The pond depth will be about 5 feet below the existing ground surface.  Final slope angles of as steep as 3H:1V (Horizontal: Vertical) are expected.	
Detention/Retention	A detention pond is planned as part of the project. It is expected to be about 5 feet deep.	
Pavements	We understand that the drive from Owens Street to Jackson Street and a small parking area will be constructed as part of the initial construction. The 290-space parking lot, located on the south side of the dome	

Barnwell High School Safe Room Barnwell, SC March 16, 2021 Terracon Project No. 73205002



Item	Description		
	building, will be built at a later time. Flexible (asphalt) pavement is considered for parking and drive areas.		
Estimated Start of Construction	Not provided.		

## **GEOTECHNICAL CHARACTERIZATION**

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration Results** section and the GeoModel can be found in the **Figures** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	Silty/Clayey Sand	Loose to medium dense, fine to medium grained, brown
2	Sandy Fat Clay	Stiff to very stiff, tan to gray

Groundwater was encountered at depths of 2 to 10 feet bgs in most test borings at the time of field exploration. When checked 24 hours after drilling, groundwater was measured at depths of 1 to 10 feet bgs. These observations represent groundwater conditions at the time of the field exploration, and may not be indicative of other times, or at other locations. Groundwater levels can be expected to fluctuate with varying seasonal and weather conditions.

Very loose soils were encountered within the upper 6 feet of Borings B-4, B-4A, and B-7. A review of the historical aerial photos indicates that the alignment of these borings generally follows the previous extension of the ditch present across the vegetated land on the west side of Jackson Street. The ditch was apparently backfilled as a part of the existing development.

Laboratory testing was performed on representative samples of the various soils encountered by the borings. Based on the results, the site soils are silty/clayey sands underlain by sandy fat clays. The fines contents of the silty/clayey sands vary from 20 to 40 percent and their moisture contents vary from 14 to 23 percent. The fines content of the sandy fat clay varies from 53 to 70 percent with the moisture content between 22 to 28 percent. The maximum dry unit weight and optimum moisture of the surficial silty/clayey sands determined from standard Proctor test are 114.2 pcf and 13.2 percent; respectively.

Barnwell High School Safe Room Barnwell, SC March 16, 2021 Terracon Project No. 73205002



## **GEOTECHNICAL OVERVIEW**

Based on the exploration results, the site is generally suited for the planned development provided the recommendations in this report are followed. The site soils generally consist of loose to medium dense silty/clayey sands underlain by stiff to very stiff sandy fat clay. Presuming the foundations bear on soils similar to those encountered by most of the borings or on structural fill supported by similar native soils, the structure can be supported by conventional spread/strip footings with tolerable settlement estimates. The **Shallow Foundations** section addresses support of the building bearing on firm native soil or engineered fill. Repair of the foundation subgrades will be required to address conditions such as those encountered at Boring B-4/B-4A.

The first geotechnical consideration is the presence of very loose surficial soils encountered in Borings B-4/B-4A (in the planned safe room footprint) and in Boring B-7 (in the planned detention pond). As mentioned earlier, these materials appear to be existing fill associated with the filling of a drainage feature during the original school development. These soils are very low density/consistency and extend to at least 6 feet below the existing ground surface. As part of the initial development activities these soils should be removed and replaced. Considering wet conditions and the shallow groundwater encountered in several areas, the use of open-graded stone (such as #57 stone) or very course, well-graded sand as backfill material should be considered. The full extent of the area (length and width) associated with these conditions is not known at this time but can be assumed to be present between the noted borings, crossing the planned roadway and extending further to the east into the dome building footprint.

The second consideration is the presence of shallow groundwater in many of the borings. Groundwater depths in many of the borings were less than 5 feet below the existing ground surface. Others indicated cave-in levels at similar depths, sometimes an indication of the presence of groundwater. Considering the flat condition of the site and the level of precipitation leading up to the work, the noted conditions (at least in part) could be a perched water condition. Nevertheless, the potential for shallow groundwater should be anticipated during the construction process as well as over the life of the project. In construction, typical excavations (those associated with structure foundations and utilities) could encounter groundwater. It would be prudent to at least modestly raise the grades of the building areas to provide additional separation between the foundations and floor slab and the groundwater surface. Minimizing the utility invert depths will also help to lessen the impact of the groundwater on construction. Longer term, we recommend the inclusion of an underdrain system in the building areas to help remove groundwater from the shallow soils should they rise close to the subgrade level. The use of open ditches or french drains to help manage the shallow groundwater is also prudent. Converting the storm drain system to function as a french drain may be possible but would be dependent on the storm drain layout and can be considered when the stormwater plans are available. Additional recommendations regarding the groundwater control are provided in the Earthwork section. The full impact of the groundwater will be heavily dependent on the site grading plan. Once available, it should be provided to Terracon to see whether any modifications to the report are necessary.

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The on-site excavated soils (silty/clayey sands) can be used as structural fill below the buildings and pavement areas provided they are dried to the level described in the **Earthwork** section. The moisture contents of these soil are above the optimum moisture content level. In some areas, the moisture content is more than 10 percent above that level. Sandy fat clay in the planned pond area (thought to be existing fill) should not be used as structural fill but could be used to fill non-structural areas, if needed. This material was also very wet and will require drying to facilitate placement and compaction.

The Floor Slabs section addresses slab-on-grade support of the building. Flexible pavement system is considered for this site. The Pavements section addresses the design of pavement systems. The recommendations contained in this report are based upon the results of data presented herein, engineering analyses, and our current understanding of the proposed project. The General Comments section provides an understanding of the report limitations.

## **EARTHWORK**

Earthwork is anticipated to include site stripping, subgrade preparations, excavations, and fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

## **Site Preparation**

The existing topsoil, vegetation, asphalt pavement, remnants of past construction, and any other unsuitable materials should be stripped and removed from the construction area. Stripping should extend at least 10 feet beyond the construction limits. The topsoil thicknesses were up to 3-½ inches at the boring locations but will vary across the site. Clean topsoil may be stockpiled for reuse in landscaped areas or pavement shoulders. Once the contractor's stripping activities nears completion, we recommend that our representative observe the subgrade to identify any remaining pockets of organics or unsuitable material that should be removed.

Existing drainage ditches fall within the construction area and will be filled as part of the grading activities. Their subgrades were wet and soft during our site visit. The ditch areas should be stripped of topsoil and soft materials to expose a firm soil in preparation for fill placement. It may be necessary to place an initial layer of clean sand across the bottom of the ditches to stabilize the subgrade prior to placing the general mass structural fill. More specific recommendations can be provided by the Terracon geotechnical engineer in the field at the time of subgrade evaluation.

Special precautions should be made to remove all underground utilities and their associated backfill as the structures and pavements may overlay these materials. Care should be given to locating and addressing these items during the site preparation phase of the project. If loose soils

Barnwell High School Safe Room Barnwell, SC March 16, 2021 Terracon Project No. 73205002



or utilities are overlooked, they could be detrimental to the long-term performance of the structures and pavements.

## **Subgrade Drainage**

The borings indicate that groundwater levels were less than 5 feet in many areas of the site and as shallow as 1 to 3 feet in the dome building footprint. Groundwater at these shallow levels coupled with the soil type and consistency may result in an unstable subgrade condition. Depending on the final grading plans, excavations for foundations and utility trenches in these areas will likely encounter groundwater conditions. Once the final grading plans are available, they should be provided to Terracon to review and update as necessary the recommendations presented in this report.

Presuming the planned grades are close to the existing grades, we recommend lowering and maintaining the groundwater levels to at least 3 feet below the stripped initial subgrade. To do so, a series of shallow drainage ditches can be excavated along the perimeter and across the footprints to provide groundwater an outlet from the soil. Depending on the effectiveness of the initial ditching, additional trenches or deepening the initial ones may be needed to help lower the groundwater levels by shortening the drainage paths or increasing the elevation difference. Initial excavation and modification should be in consultation with the Geotechnical Engineer. This should be performed as early as practical in the construction process to allow the shallow soil to begin to dry in preparation for subgrade preparation. As discussed in the Floor Slabs section, the ditches should be converted to french drains to use in a permanent groundwater control system.

In addition to the building, ditches along the roadway and around the planned parking areas will also be beneficial to help address the shallow groundwater conditions. Depending on its layout, it may be possible to incorporate the storm drain system into the permanent french drain/underdrain system. Essentially, the trenches of the storm drain lines would become french drains, allowing groundwater to weep into the system. The practicality of this can be determined when the storm drain system plans are formalized.

## **Subgrade Preparation**

The extent of subgrade preparation over most of the site will be dependent upon the final grades. The final grading plan may impact some of our recommendations in this report. At the time of our field exploration, the surficial site soils were wet of their optimum moisture levels. If the moisture conditions during construction are as then, the subgrade is likely to be unstable under a proofrolling load. After stripping and installation of the noted drainage ditches, the exposed soils should be uniformly moisture conditioned (dried) to a depth of about 1 foot by turning the soil with a harrow or similar equipment to expose it and then compacting it to enhance the support characteristics of the subgrade and to prepare it for subsequent fill placement. We recommend the subgrade be compacted to a target relative density of 95 percent of the standard Proctor at the stripped subgrade level.

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Loose silty/clayey sands were present in Borings B-2, B-5, B-6, and B-9. These soils may require additional repairs beyond surficial drying and recompaction to provide a stable subgrade for support of structural fills, pavement and floor slabs. Given the soil type and condition, we expect that the repair options will include removal of the upper soils (potentially up to a depth of about 2 feet in some areas), moisture conditioning of the exposed subgrade, re-placement of the excavated soils in thin compacted lifts (after drying). The soils should be compacted at 95 percent of maximum dry unit weight and within 2 percent of optimum moisture consistent with **Fill Compaction Requirements**, below.

Very low consistency soils were encountered in the footprint of the planned dome building (Borings B-4/B-4A) and in the planned detention pond area (indicated in Boring B-7) to the depth of 6 feet bgs. As noted, these materials appear to be existing fill associated with the filling of a drainage feature across the site during the original school development. As part of the initial development activities these soils should be removed and replaced. Considering wet conditions and the shallow groundwater encountered in several areas, the use of open-graded stone (such as #57 stone) or very course, well-graded sand as backfill material should be considered.

In addition to density testing to verify the level of compaction of the soil reached, the exposed subgrades in the building/paved areas should be proofrolled to check for more deep-seeded unstable soil conditions and further evaluate the effectiveness of the subgrade compaction. Proofrolling should be performed with a heavily loaded tandem axle dump truck or with similar approved construction equipment under the observation of the Terracon geotechnical engineer. Where conditions are found to be unstable under the proofrolling load, the subgrade should be undercut to soils that would provide a firm base for the compaction of the structural fill. The undercut soils should be dried and re-placed with excavated soils in thin compacted lifts, placed as described in the following section of this report. Mass fill placement may commence after proofrolling has been successfully completed and any needed repairs to the subgrade have been made.

As noted earlier, the on-site soils are wet of their optimum moisture contents. We recommend that site grading occur in the summer season to benefit from the longer days and hotter temperatures to facilitate drying of the subgrade soils. It should be anticipated that site work will require aggressive mechanical drying methods using disks and harrows operating continuously over site areas so as to turn the wet soils to depths of 8 to 10 inches. We note that mechanical drying can be time-consuming and is dependent on the weather. Winter conditions are not conducive to continuous site work and will exacerbate the problematic soil conditions. In wetter/colder periods of the year, chemical drying with lime or cement or mixing the wetter soils with drier soils may be a more viable option.

The exposed subgrade soils will be composed of primarily silty/clayey sands which can become unstable when exposed to construction traffic after periods of inclement weather especially during colder periods of the year. This traffic exposure to wet subgrades can destabilize what would

Barnwell High School Safe Room Barnwell, SC March 16, 2021 Terracon Project No. 73205002



have been otherwise satisfactory conditions, requiring further repair. As a precaution, we recommend that once the planned subgrade levels have been achieved, the construction traffic be rerouted from planned structural areas after periods of precipitation to allow them to dry. This should help to reduce the amount of subgrade repairs required later in the project. Positive drainage should be maintained at all times to prevent ponding of stormwater on exposed subgrades as filling process or during the operations life of the structure. Additionally, when inclement weather or when lengthy breaks in construction are anticipated, exposed subgrade soils should be rolled smooth to limit stormwater infiltration into prepared subgrade soils.

## Fill Material Types

Structural fill should meet the following material property requirements. The shallow on-site soils can generally be used as structural fill. The existing moisture contents are close to optimum moisture.

Soil Type <sup>1</sup>	USCS Classification	Acceptable Location for Placement
Imported Structural Fill	SM and SC	All locations and elevations
On-Site Soils <sup>2,3</sup>	SM, SC, CH	All locations and elevations
Imported Sand and Gravel 4	GW	Deeper excavation backfill and french drain media

- 1. Structural fill should consist of approved materials free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.
- 2. The site soils are significantly wet of optimum and should be dried to moisture close to optimum.
- 3. The use of sandy fat clays is recommended only in non-structural areas.
- 4. The use of open-graded stone (such as #57 stone) or very course, well-graded sand is recommended as backfill material after the removal of the existing fill from the previously filled drainage area across the site (along B-4/B-7 alignment) and as initial fill in the existing ditches across the site.

## **Fill Compaction Requirements**

Structural fill should meet the following compaction requirements.

ltem	Description
Maximum Lift Thickness	8 inches or less in loose thickness when heavy, self-propelled compaction equipment is used. 4 inches in loose thickness when hand-guided equipment
Minimum Compaction Requirements <sup>1</sup>	(i.e. jumping jack or plate compactor) is used.  95% of the material's standard Proctor maximum dry unit weight (ASTM D 698)
Water Content Range	-2% to +2% of optimum

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Item Description

We recommend that engineered fill be tested for moisture content and compaction during placement. Should
the results of the in-place density tests indicate the specified moisture or compaction limits have not been met,
the area represented by the test should be reworked and retested as required until the specified moisture and
compaction requirements are achieved.

## **Grading and Drainage**

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. The roof should have gutters/drains with downspouts that discharge directly onto the storm drain system.

## **Earthwork Construction Considerations**

The boring data indicate that the site soils should generally be excavatable using conventional construction equipment. Trenches and other shallow excavations can be performed using medium to large, rubber-tired backhoes. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

The shallow groundwater conditions may also affect the installation of the underground utilities. Where the groundwater surface will be penetrated by less than about 2 feet, it may be possible to control the groundwater from within the excavation. If the contractor can work in relatively short sections (generally 30 to 40 feet depending on the actual inverts of the pipe) and can quickly excavate the trench, place the bedding, and install the pipe, it may be possible to control the groundwater using temporary drainage sumps to pump out the seeping water while the pipe is being installed. To accomplish this, a 12-inch minimum layer of open-graded stone (#57 stone or equal) or coarse clean sand can be placed at the bottom of the excavated trench to serve as drainage medium. This would also allow the contractor to avoid wet working conditions. These materials would also provide bedding for the pipe. Periodically, the contractor would need to excavate a sump pit within the trench to allow an area for the water to collect and the pump to be set. We recommend using open graded stone or coarse sand such as that used below the pipe to encase the pipe and fill the trench to a level above the original static groundwater level. This should be placed and compacted prior to excavating the next segment of the trench. During excavation of the next segment, groundwater should continue to be pumped from the prior sump location until a new sump pit is installed and functioning.

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As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

## **Slopes**

The inclination of the slopes for the planned detention pond is not provided. However, the type and consistency of the soil encountered at the pond location indicates that the pond slope of 3(H):1(V) should be stable throughout the service life of the pond.

Water flow should be directed away from any slope crests and routed quickly into the storm drain system. Minimum setbacks of 10 feet from buildings and 3 feet from curbs should be provided from all slope crests. Storm drain and pressurized water lines should not be located at the crest of fill slopes since leaking pipes or overtopping of inlets may cause maintenance problems or slope instability in the future. The designer should consider water tight connections for such piping systems if they must be located in close proximity to the crest of the new slopes.

## **Construction Observation and Testing**

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and topsoil, proofrolling, and mitigation of areas delineated by the proofroll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. One density and water content test should be performed for every 50 linear feet of compacted utility trench backfill.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

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## **SHALLOW FOUNDATIONS**

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

## **Design Parameters – Compressive Loads**

Item	Description
Maximum Net Allowable Bearing Pressure 1,2	2,500 psf
Required Bearing Stratum <sup>3</sup>	Firm native clayey/silty sand or compacted structural fill
Minimum Foundation Dimensions	Columns: 24 inches
minimum Foundation Dimensions	Continuous: 18 inches
Ultimate Coefficient of Sliding Friction <sup>4</sup>	0.35
Minimum Embedment below Finished Grade <sup>5</sup>	24 inches
Estimated Total Settlement from Structural Loads <sup>2</sup>	<1 inches
Estimated Differential Settlement <sup>2, 6</sup>	About ½ inch

- 1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
- 2. Values provided are for maximum loads noted in Project Description.
- 3. Loose surficial soils be repaired per the recommendations presented in the Earthwork section.
- 4. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
- 5. As bearing capacity requirement. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
- 6. Differential settlements are as measured over a span of 50 feet.

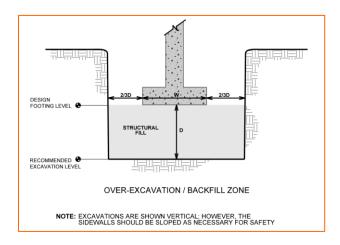
## **Foundation Construction Considerations**

As noted in **Earthwork**, the footing excavations should be evaluated under the direction of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

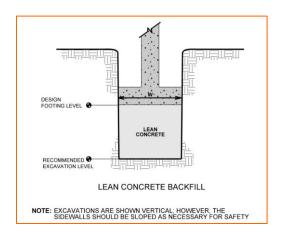
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If very loose or unsuitable bearing soils are encountered at the base of the planned footing excavation, the footing excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or over-excavation for structural fill or stone base placement below footings should be conducted as shown below. The over-excavation should be backfilled up to the footing base elevation, with structural fill placed, as recommended in the **Earthwork** section.



Alternately, the excavation can be filled with lean concrete backfill as illustrated on the sketch below.



## **SEISMIC CONSIDERATIONS**

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC).

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Based on the results of the geophysical testing, it is our professional opinion that the Seismic Site Classification is D. The weighted average shear wave velocity in the upper 100 feet was 1,045 fps. Based on the results of our liquefaction analysis, the soil profile is not expected to liquefy under the design PGA.

### **FLOOR SLABS**

The structural fill in the areas of the buildings should be compacted to the target density prior to floor slab construction. Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structures and positive drainage of the aggregate base beneath the floor slabs.

### Floor Slab Design Parameters

Item	Description
Floor Slab Support <sup>1</sup>	Minimum 4 inches of free-draining crushed aggregate compacted to at least 95% of ASTM D 698 <sup>2, 3</sup>
Estimated Modulus of Subgrade Reaction <sup>2</sup>	100 pounds per square inch per inch (psi/in) for point loads

- 1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.
- 2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in **Earthwork**, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.
- 3. Free-draining granular material should have less than 5% fines (material passing the No. 200 sieve).

A subgrade prepared and tested as recommended in this report should provide adequate support for lightly-loaded floor slabs. Slab construction can begin after the completion of any necessary undercutting or in-place stabilization. We recommend that the floor slabs be designed as "floating" slabs, that is, fully ground supported and structurally independent of any building footings or walls. This is to aid in minimizing the possibility of cracking and displacement of the floor slabs because of differential movements between the slab and the foundation. The slabs should be appropriately reinforced to support the proposed loads.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

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Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a water-proof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

### Floor Slab Construction Considerations

We recommend the area underlying the floor slab be rough graded and then thoroughly proofrolled with a loaded tandem axle dump truck prior to final grading and placement of base rock. Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed.

If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed and replaced with structural fill. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

On most project sites, the site grading is generally accomplished early in the construction phase. However, as construction proceeds, the subgrade may be disturbed due to utility excavations, construction traffic, desiccation, rainfall, etc. As a result, the floor slab subgrade may not be suitable for placement of base rock and concrete and corrective action will be required to repair the damaged areas.

All floor slab subgrade areas should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to placement of the base rock and concrete. The Geotechnical Engineer should approve the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

### **Under-slab Drainage**

To maintain the control of the groundwater beyond the temporary requirements of the construction process, we recommend that the contractor convert the ditches in the building to french drains. French drains are stone-filled, non-woven drainage fabric-lined ditches with a drainage pipe at their base. We recommend that the drainage pipes used in the ditches be minimum 4-inch

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diameter perforated corrugated plastic pipe. The drainage media should be #57 stone or a similar open-graded stone. The fabric should be laid so that it will overlap at least 1 foot at the top of the trench. In areas where the french drains are part of the pavement subgrade, the stone should be compacted into place. Terracon will be pleased to work with the designers to provide a general layout of the french drain system to collect the groundwater and protect the floor slab and pavements.

### **PAVEMENTS**

Per conversation with Mr. Desouza, the planned pavement will be constructed in two stages. In the first stage, the driveway from Owens Street to Jackson Street with parking spaces on each side will be constructed. In the second stage, the large parking area on the south side of the dome building will be constructed. Pavement designs are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the **Earthwork** section.

### **Pavement Design Recommendations**

Design of Asphaltic Concrete (AC) pavements are based on the procedures outlined in the National Asphalt Pavement Association (NAPA) Information Series 109 (IS-109). Design of Portland Cement Concrete (PCC) pavements are based upon American Concrete Institute (ACI) 330; Guide for Design and Construction of Concrete Parking Lots. The following traffic information is used for the proposed development.

Stage I: 500 cars/light trucks per day

Stage II: 1000 cars/light trucks per day

Based on our experience of similar soil conditions, we have used a CBR value of 5 for the design. If at any time larger traffic volume is expected, Terracon should be contacted to review the pavement recommendations. Subgrade preparation in the pavement areas should be performed as outlined in the **Earthwork** section of this report.

	Layer Thickness (in)				
Material	Stage I – Drive and Parking Spaces	Stage II - Parking Area			
HMA Surface Course	2	2			
Prime Coat (If required)	0.30 gal/sy	0.30 gal/sy			
Base Course	8	8			

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The above sections represent minimum thicknesses and, as such, periodic maintenance should be anticipated. Pavements subjected to high traffic volumes and heavy trucks require thicker pavement sections.

### **General Design Recommendations**

Aggregate base course should be SCDOT Graded Aggregate Base (SCDOT Section 305). Asphaltic cement concrete should be an approved mix design selected from the current SCDOT Standard Type C (SCDOT Sections 402 and 403). Compaction levels of the asphalt and Macadam Base Course materials should conform to SCDOT requirements.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install below pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

### **Pavement Maintenance**

The pavement sections represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore, preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the priority when implementing a pavement maintenance program. Additional engineering observation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

### **GENERAL COMMENTS**

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur

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between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

### **FIGURES**

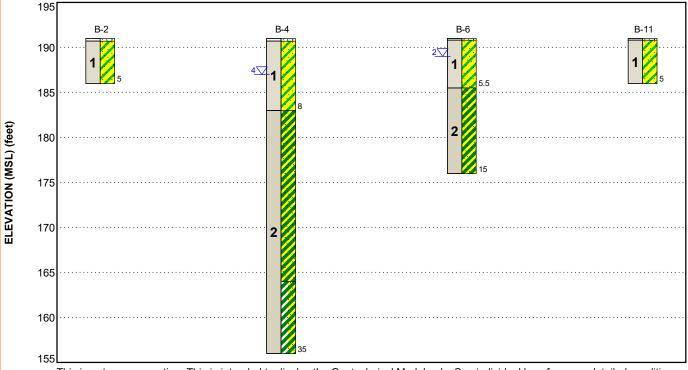
**Contents:** 

GeoModel

#### **GEOMODEL**

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This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	ayer Layer Name General Description			
1	Silty/Clayey Sands	Loose to medium dense, fine to medium grained, brown		
2	Sandy Fat Clay	Stiff to very stiff, tan to gray		

### **LEGEND**

Topsoil

Fat Clay with Sand





- ✓ First Water Observation
- ▼ Second Water Observation

#### NOTES:

Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

## **ATTACHMENTS**

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### **EXPLORATION AND TESTING PROCEDURES**

### Field Exploration

Eleven (11) test borings were drilled at the site between February 17, 2021 and February 22, 2021. The borings were drilled to depths ranging from approximately 5 feet to 50 feet bgs. Approximate locations of the borings are shown on the **Exploration Plan**.

**Boring Layout and Elevations:** Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet) and approximate elevations were obtained by interpolation from the provided topography. If elevations and a more precise boring layout are desired, we recommend borings be surveyed following completion of fieldwork.

**Subsurface Exploration Procedures:** We advanced the borings with a truck-mounted drill rig using continuous hollow stem flight augers. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. A standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches.

The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. Select borings were left open to see whether groundwater would accumulate over night after drilling. Once the groundwater measurements were recorded, the borings were backfilled with auger cuttings after their completion.

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. Published correlations between the SPT values and soil properties are based on the lower efficiency cathead and rope method. This higher efficiency affects the standard penetration resistance blow count (N) value by increasing the penetration per hammer blow over what would be obtained using the cathead and rope method. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations.

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These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

### **Shear Wave Velocity Testing**

Terracon utilized the SeisOpt<sup>®</sup> ReMi<sup>™</sup> method to develop the full depth shear wave velocity profile at the site for use in determining the seismic site class. This method employs non-linear optimization technology to derive one-dimensional S-wave velocities from refraction microtremor (ambient noise) recordings using a typical seismograph and standard, low frequency, refraction geophones. We utilized a series of receivers (geophones) set along a straight-line array with a 25±-foot receiver spacing for a total length of about 275 feet along Array 1 shown on Exploration Plan. Unfiltered, 30-second records were recorded using the background 'noise' created by the moving traffic and other ambient vibrations. The collected data, the response spectrum in the 5 to 40 Hz range, was processed using the computer software SeisOpt<sup>®</sup> ReMi<sup>™</sup> by Optim, LLC with the results plotted as a conventional shear wave velocity vs. depth profile. The shear wave velocity profile obtained using the SeisOpt<sup>®</sup> ReMi<sup>™</sup> data reduction method is shown in Exploration Results.

### **Laboratory Testing**

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture)
   Content of Soil and Rock by Mass
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
- ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

### SITE LOCATION AND EXPLORATION PLANS

### **Contents:**

Site Location Plan Exploration Plan

Note: All attachments are one page unless noted above.

### **SITE LOCATION**

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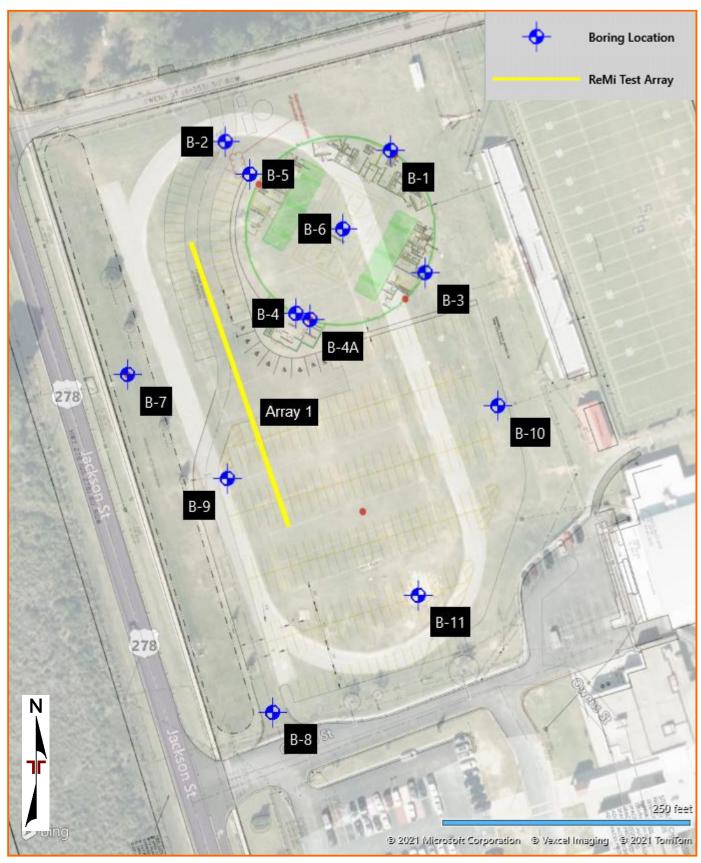




### **EXPLORATION PLAN**

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### **EXPLORATION RESULTS**

### **Contents:**

Boring Logs (B-1 through B-11) Shear-Wave Velocity Profile Summary of Laboratory Results Atterberg Limits Grain Size Distribution Curve Moisture Density Relationship

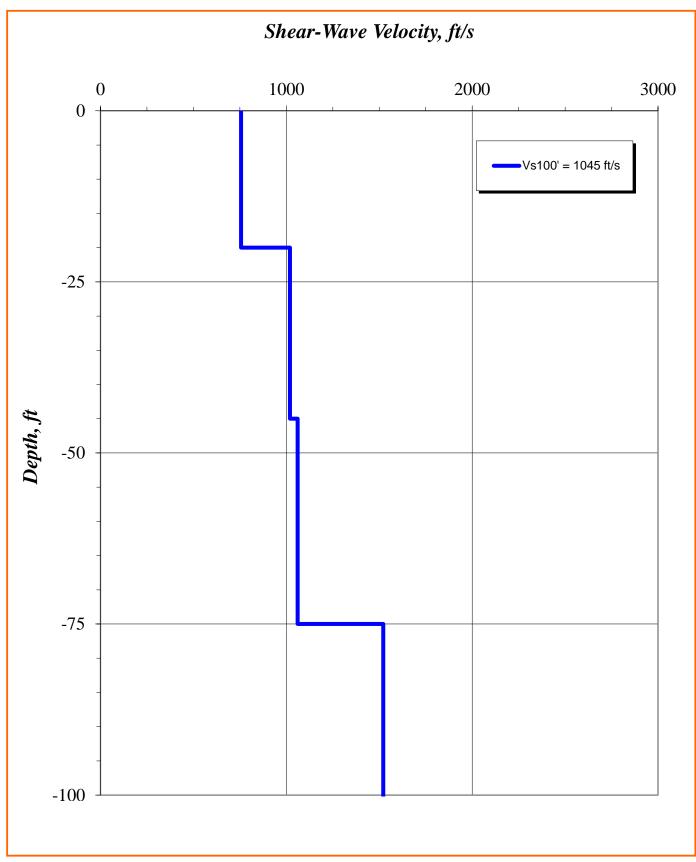
Note: All attachments are one page unless noted above.

			BORING L	OG NO	). B-	6					Page 1 of	1_
F	PROJ	ECT: BHS - Safe Room		CLIENT:	Thon	nas & mbia.	Hut	ton	Engineer	ing Co		
5	SITE:	474 Jackson Street Barnwell, SC		-	-	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						
MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 33.2304° Longitude: -81.3602°  DEPTH	Approximate Sur	face Elev.: 191	` ′	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	LL-PL-PI	PERCENT FINES
		0.2.∧TOPSOIL, (2 inches)  CLAYEY SAND (SC), fine to medium gra Plain)	ined, brown, loose, (		^191+ <i>I</i> /	-		X	3-4-4 N=8			
1						- -		X	3-4-5 N=9			
3/15/21		5.5 SANDY FAT CLAY (CH), gray, stiff to ver	y stiff		185.5+/-	5 <del>-</del> -		X	5-6-6 N=12			
MPLAIE.GD 2						- 10-		X	5-8-9 N=17			
DAIAIEN						-						
I EKKACO		15.0  Boring Terminated at 15 Feet			176+/-	- - 15-		X	8-14-14 N=28			
KOOM.GPJ		Borning Terminated at 131 eet										
JS - SAFE F												
3205002 BF												
NO WELL												
MARI LOG-												
KI. GEO S												
SINAL REPO												
FKOM OKIG												
AKA IED	St	atification lines are approximate. In-situ, the transition ma	ay be gradual.			Han	nmer T	ype: /	Automatic			
Adv Adv 2	vanceme 2-1/4" Co	ent Method: ontinuous Flight Auger	See Exploration and Te description of field and I used and additional data	laboratory proce		Note	s:					
		ent Method: ackfilled with auger cuttings upon completion.	See Supporting Informa symbols and abbreviation		tion of							
		WATER LEVEL OBSERVATIONS (End of Drilling)	75			Boring	Starte	d: 02-	17-2021	Boring Cor	npleted: 02-22-	-2021
NOR NOR		free water observed after 5 Days		900		Drill R	ig: CMI	E-45C	;	Driller: S. 7	Truesdale	
	€L Ca	ve-in 2' (After 5 Days)		mson Rd bia, SC		Projec	t No.: 7	73205	002			

### **REMI ARRAY PROFILE**

BHS Safe Room Barnwell, SC
March 16, 2021 Terracon Project No. 73205002





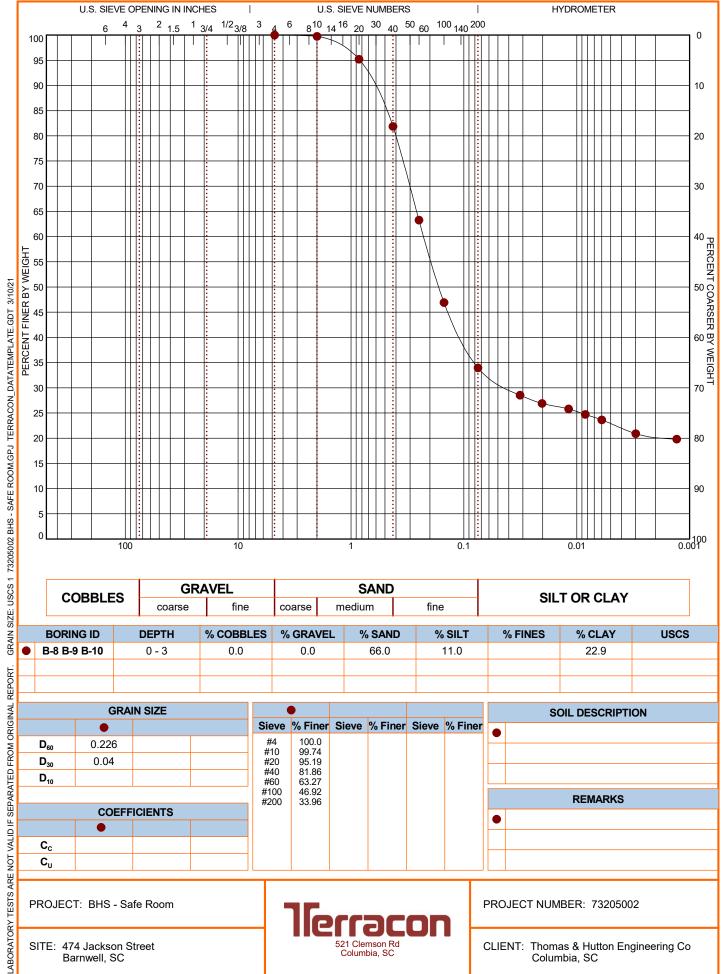
### **Summary of Laboratory Results**

Summary of Laboratory Results						, and	Sheet 1 of 1	
	BORING ID	Depth (Ft.)	Liquid Limit	Plastic Limit	Plasticity Index	% Fines	Water Content (%)	
	B-8 B-9 B-10	0 - 3				34.0	21.7	
	B-1	1 - 2.5				39.5	18.6	
	B-1	3.5 - 5					19.1	
	B-1	6 - 7.5				56.0	21.8	
	B-1	8.5 - 10					22.3	
	B-1	13.5 - 15					15.5	
	B-3	1 - 2.5					18.9	
	B-3	3.5 - 5					16	
10/21	B-3	6 - 7.5					21.6	
JT 3/	B-3	8.5 - 10					16.3	
E.G	B-4	1 - 2.5				20.1	14.4	
IPLA]	B-5	13.5 - 15				29.6	16.6	
ATEN	B-5	23.5 - 25	75	26	49	69.9	27.8	
DAT	B-7	1 - 2.5				53.1	24.2	
CON	B-7	3.5 - 5					28.2	
ERRA	B-8	1 - 2.5					21.3	
ا ا	B-10	1 - 2.5					22.5	
LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART LAB SUMMARY-PORTRAIT 73205002 BHS - SAFE ROOM GPJ TERRACON_DATATEMPLATE.GDT 3/10/21								
RY TESTS ARE	PROJECT: BHS - Safe Room		Terracon		PROJECT NUMBER: 73205002			
LABORATO		SITE: 474 Jackson Street Barnwell, SC		521 Clemson Rd Columbia, SC		CLIENT: Thomas & Hutton Engineering Co Columbia, SC		



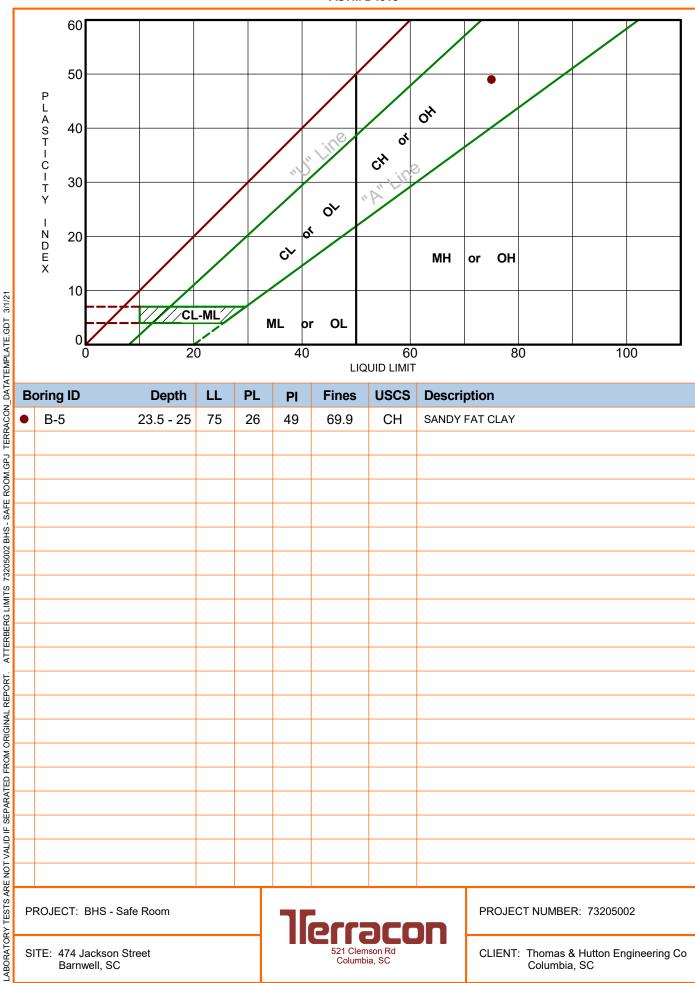
### **GRAIN SIZE DISTRIBUTION**

**ASTM D422 / ASTM C136** 



### ATTERBERG LIMITS RESULTS

**ASTM D4318** 



В	oring ID	Depth	LL	PL	PI	Fines	USCS	Description
•	B-5	23.5 - 25	75	26	49	69.9	СН	SANDY FAT CLAY
• • • • • • • • • • • • • • • • • • •								
							-	

PROJECT: BHS - Safe Room

SITE: 474 Jackson Street Barnwell, SC

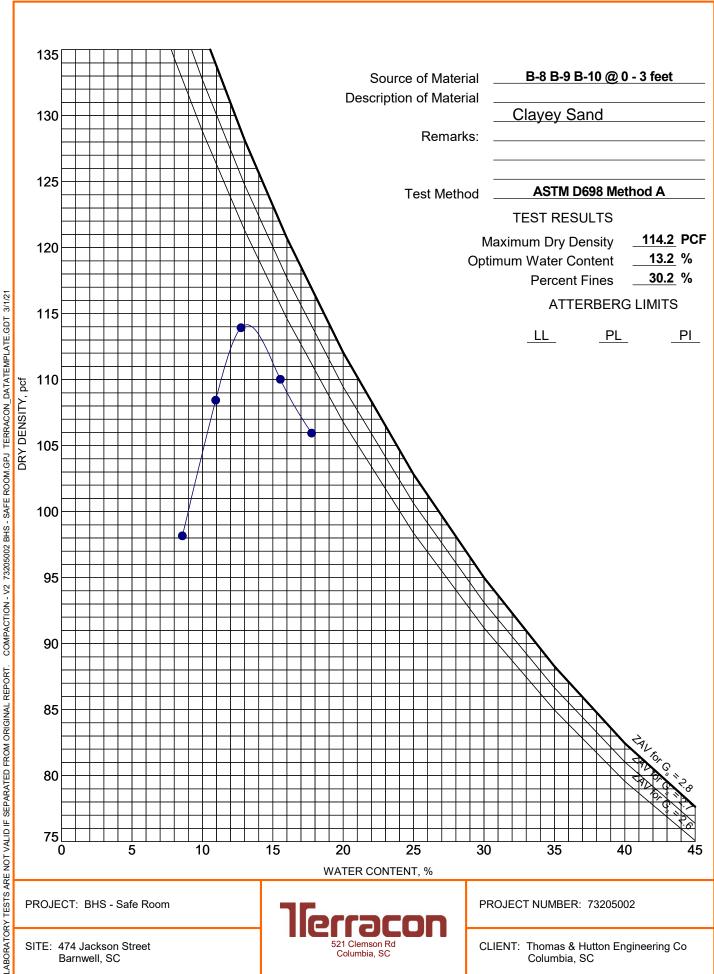


PROJECT NUMBER: 73205002

CLIENT: Thomas & Hutton Engineering Co Columbia, SC

### MOISTURE-DENSITY RELATIONSHIP

**ASTM D698/D1557** 



PROJECT: BHS - Safe Room

SITE: 474 Jackson Street Barnwell, SC



PROJECT NUMBER: 73205002

CLIENT: Thomas & Hutton Engineering Co Columbia, SC

### **SUPPORTING INFORMATION**

### **Contents:**

General Notes Unified Soil Classification System

Note: All attachments are one page unless noted above.



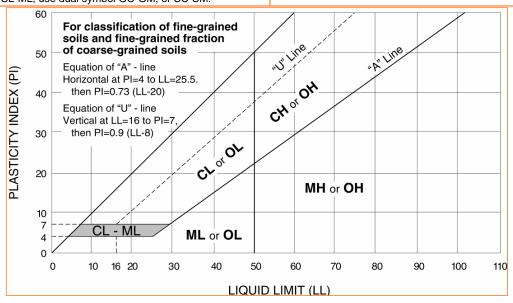
	Soil Classification					
Criteria for Assigni	ing Group Symbols	and Group Names	Using Laboratory	Tests A	Group Symbol	Group Name <sup>B</sup>
		Clean Gravels:	Cu ≥ 4 and 1 ≤ Cc ≤ 3 E		GW	Well-graded gravel F
	Gravels: More than 50% of	Less than 5% fines <sup>C</sup>	Cu < 4 and/or [Cc<1 or C	Cc>3.0] <b>E</b>	GP	Poorly graded gravel F
	coarse fraction retained on No. 4 sieve	Gravels with Fines:	Fines classify as ML or N	ЛΗ	GM	Silty gravel F, G, H
Coarse-Grained Soils: More than 50% retained	retained on No. 4 sieve	More than 12% fines <sup>C</sup>	Fines classify as CL or C	Н	GC	Clayey gravel <sup>F, G, H</sup>
on No. 200 sieve		Clean Sands:	$Cu \ge 6$ and $1 \le Cc \le 3$		SW	Well-graded sand
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Less than 5% fines D	Cu < 6 and/or [Cc<1 or Cc>3.0]		SP	Poorly graded sand
		Sands with Fines:	Fines classify as ML or MH		SM	Silty sand G, H, I
		More than 12% fines D	Fines classify as CL or CH		sc	Clayey sand <sup>G, H, I</sup>
	Silts and Clays: Liquid limit less than 50	Ingraphic	PI > 7 and plots on or above "A"		CL	Lean clay K, L, M
		Inorganic:	PI < 4 or plots below "A" line J		ML	Silt K, L, M
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay K, L, M, N
Fine-Grained Soils: 50% or more passes the		Organic.	Liquid limit - not dried	< 0.73	OL.	Organic silt K, L, M, O
No. 200 sieve		Inorganic:	PI plots on or above "A" line		CH	Fat clay <sup>K, L, M</sup>
	Silts and Clays:	morganic.	PI plots below "A" line		MH	Elastic Silt K, L, M
	Liquid limit 50 or more	Organic:	Liquid limit - oven dried	< 0.75	ОН	Organic clay K, L, M, P
		Organio.	Liquid limit - not dried		511	Organic silt K, L, M, Q
Highly organic soils:	Primarily	organic matter, dark in co	olor, and organic odor		PT	Peat

- A Based on the material passing the 3-inch (75-mm) sieve.
- <sup>B</sup> If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
- Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
- Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

E Cu = 
$$D_{60}/D_{10}$$
 Cc =  $\frac{(D_{30})^2}{D_{10} \times D_{60}}$ 

- F If soil contains ≥ 15% sand, add "with sand" to group name.
- <sup>G</sup> If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

- HIf fines are organic, add "with organic fines" to group name.
- If soil contains ≥ 15% gravel, add "with gravel" to group name.
- If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
- K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
- $^{\mbox{\scriptsize L}}$  If soil contains  $\geq$  30% plus No. 200 predominantly sand, add "sandy" to group name.
- MIf soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
- PI < 4 or plots below "A" line.
- PI plots on or above "A" line.
- QPI plots below "A" line.



# GENERAL NOTES DESCRIPTION OF SYMBOLS AND ABBREVIATIONS



SAMPLING	WATER LEVEL	FIELD TESTS
	_ <u></u> Water Initially Encountered	N Standard Penetration Test Resistance (Blows/Ft.)
Grab Split Spoon	Water Level After a Specified Period of Time	(HP) Hand Penetrometer
Sample	Water Level After a Specified Period of Time	(T) Torvane
	Water levels indicated on the soil boring logs are the levels measured in the borehole at the times	(DCP) Dynamic Cone Penetrometer
	indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible	UC Unconfined Compressive Strength
	with short term water level observations.	(PID) Photo-Ionization Detector
		(OVA) Organic Vapor Analyzer

#### **DESCRIPTIVE SOIL CLASSIFICATION**

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

### **LOCATION AND ELEVATION NOTES**

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

	STRENGTH TERMS						
RELATIVE DENSITY	OF COARSE-GRAINED SOILS		CONSISTENCY OF FINE-GRAINED SOILS				
	retained on No. 200 sieve.) r Standard Penetration Resistance	(50% or more passing the No. 200 sieve.)  Consistency determined by laboratory shear strength testing, field visual-n procedures or standard penetration resistance					
Descriptive Term (Density)			Unconfined Compressive Strength Qu, (tsf)	Standard Penetration or N-Value Blows/Ft.			
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1			
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4			
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8			
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15			
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30			
		Hard	> 4.00	> 30			

RELATIVE PROPORTIONS	S OF SAND AND GRAVEL	RELATIVE PROPORTIONS OF FINES		
Descriptive Term(s) of other constituents	Percent of Dry Weight	Descriptive Term(s) of other constituents	Percent of Dry Weight	
Trace	<15	Trace	<5	
With	With 15-29		5-12	
Modifier	Modifier >30		>12	
GRAIN SIZE T	ERMINOLOGY	PLASTICITY DESCRIPTION		
Major Component of Sample	Particle Size	Term	Plasticity Index	
Boulders	Over 12 in. (300 mm)	Non-plastic	0	
Cobbles	Cobbles 12 in. to 3 in. (300mm to 75mm)		1 - 10	
Gravel	Gravel 3 in. to #4 sieve (75mm to 4.75 mm)		11 - 30	
Sand	Sand #4 to #200 sieve (4.75mm to 0.075mm		> 30	
Silt or Clay Passing #200 sieve (0.075mm)				

### SECTION 02 41 13 - SELECTIVE SITE DEMOLITION

#### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work of this section.

### 1.2 DESCRIPTION OF WORK

A. Extent of selective demolition work is indicated on drawings.

### 1.3 SUBMITTALS

A. Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to Owner's representative for review prior to commencement of work. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection. Include schedule and location for return of items identified on plans to be delivered to Owner of property.

### 1.4 JOB CONDITIONS

- A. Condition of Structures: Owner assumes no responsibility for actual condition of items to be demolished.
- B. Partial Demolition and Removal: Items indicated to be removed but of value to Contractor may be removed as work progresses. Transport salvaged items from site as they are removed.
  - Storage or sale of removed items on site will not be permitted.
- C. Protections: Provide temporary barricades and other forms of protection as required to protect Owner's personnel and general public from injury due to selective demolition work.

Protect from damage existing finish work to remain in place and becomes exposed during demolition operations. Remove protections at completion of work.

### 1.5 DAMAGES

A. Promptly repair damages caused to adjacent facilities by demolition work at no cost to Owner.

#### 1.6 TRAFFIC

- A. Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
- B. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways.

### 1.7 EXPLOSIVES

A. Use of explosives will not be permitted.

#### 1.8 UTILITY SERVICES

A. Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.

#### 1.9 ENVIRONMENTAL CONTROLS

A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.

#### 1.10 MEASUREMENT AND PAYMENT

A. There will be no measurement for selective demolition. Payment will be made at the contract lump sum price. Payment will include equipment, labor, materials, protection, clean-up, disposal, and all work necessary to complete the selective demolition shown on the construction drawings.

# PART 2 – PRODUCTS (NOT USED)

#### PART 3 – EXECUTION

## 3.1 PREPARATION

- A. Prior to commencement of selective demolition work, check areas in which work will be performed. Photograph or video existing conditions of surfaces, equipment, or surrounding properties that could be misconstrued as damage resulting from selective demolition work. File with Owner's representative prior to starting work.
- B. Cover and protect equipment and fixtures to remain from soiling or damage when demolition work is performed in areas from which such items have not been removed.

#### 3.2 DEMOLITION

- A. Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with demolition schedule and governing regulations.
- B. Demolish concrete in small sections. Cut concrete at junctures with construction to remain using power-driven masonry saw or hand tools. Do not use power-driven impact tools.

- C. Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel, and sand, free of trash and debris, stones over 2" diameter, roots, or other organic matter.
- D. If unanticipated mechanical, electrical, or structural elements, which conflict with intended function or design, are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner's representative in written, accurate detail. Pending receipt of directive from Owner's representative, rearrange selective demolition schedule as necessary to continue overall job progress without delay.

#### 3.3 SALVAGE MATERIALS

- A. Owner assumes no responsibility for loss or damage to materials or structures on site, salvage value of which Contractor may have reflected in his bid.
- B. Any articles of historic significance will remain the property of the Owner. Notify Owner's representative if such items are encountered and obtain acceptance regarding method of removal and salvage for Owner.

#### 3.4 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove all debris, rubbish and other materials resulting from demolition operations from site. Transport and legally dispose of materials off site.
- B. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
- C. Burning of demolition debris materials is not permitted on the project site.

#### 3.5 CLEAN-UP AND REPAIR

- A. Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave site clean.
- B. Repair demolition performed in excess of required work. Return structures and surfaces to remain to the condition existing prior to commencement of selective demolition work. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.
- C. Fill in all voids created by selective demolition and grade site to drain. Grass all disturbed areas for erosion control.

# END OF SECTION

## SECTION 03 30 00 - CONCRETE

#### PART 1 – GENERAL

## 1.1 SECTION INCLUDES

A. Concrete sidewalks, curbs, gutters, dumpster pad, and drainage structures.

## 1.2 RELATED SECTIONS

- A. Section 31 00 00 Earthwork: Preparation of site for paving and base.
- B. Section 32 11 23 Aggregate Base Courses.
- C. Section 32 12 16SC Asphalt Paving.
- D. Section 33 10 00SC Water Utilities.
- E. Section 33 30 00 Sanitary Sewerage Utilities.
- F. Section 33 40 00 Storm Drainage Utilities.

#### 1.3 MEASUREMENT AND PAYMENT

A. No separate payment will be made for site concrete. Site concrete will be paid for in the lump sum contract for the project.

# 1.4 REFERENCES (LATEST REVISION)

- A. ACI 117 Specifications for Tolerances for Concrete Construction and Materials.
- B. ACI 301 Specifications for Structural Concrete.
- C. ACI 304R Guide for Measuring, Mixing, Transporting and Placing Concrete.
- D. ASTM A 185 Steel Welded Wire Reinforcement, Plain, for Concrete.
- E. ASTM C 31 Making and Curing Concrete Test Specimens in the Field.
- F. ASTM C 33 Concrete Aggregates.
- G. ASTM C 39 Compressive Strength of Cylindrical Concrete Specimens.
- H. ASTM C 94 Ready-Mixed Concrete.
- I. ASTM C 150 Portland Cement.
- J. ASTM C 172 Sampling Freshly Mixed Concrete.

- K. ASTM C 260 Air-Entraining Admixtures for Concrete.
- L. ASTM C 309 Liquid Membrane-Forming Compounds for Curing Concrete.
- M. ASTM C 494 Chemical Admixtures for Concrete.
- N. ASTM C 920 Elastomeric Joint Sealants.
- O. ASTM D 3740 Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- P. ASTM E 329 Agencies Engaged in Construction Inspection and/or Testing.

## 1.5 PERFORMANCE REQUIREMENTS

A. As indicated on the contract drawings.

#### 1.6 SUBMITTALS FOR REVIEW

- A. Product Data: Provide data on joint filler, admixtures, and curing compounds.
- B. Concrete Design Mix.

## 1.7 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301, ACI 318, and ACI 330R.
- B. Obtain cementitious materials from same source throughout.
- C. Conform to ACI 117 Specifications for Tolerances for Concrete Construction and Materials.
- D. Method of measurement for accessible route with a 24" digital smart-level will be used to measure points along the accessible route. Line of measurement shall be parallel to the long edge of ramp or accessible route, whether straight or curved. Longitudinal measurement lines shall be spaced 3 feet apart, but in no case shall fewer than two lines be used. The horizontal measurement [cross-slope] will be measured every [6] feet. Engineer reserves the right to gather additional measurements if further investigation is necessary. The 24" Smart-level slope readings greater than specified tolerance within contract documents will be identified as non-compliant and not accepted.
- E. Engineer reserves the right to mark and reject portions of concrete not within tolerance as specified.
- F. Accessible Route Tolerance by measuring Floor Flatness and Levelness. Traffic floors [All Accessible Routes] shall conform to the following surface profile tolerances:
  - a. <u>Floor Designation</u>: All floor areas not specified to be part of the "defined traffic floor" [Accessible Routes] shall be part of a "random traffic floor" [Non-accessible Route]. Any floor slab comprising part of the traffic floor shall be designated a "traffic slab" [Accessible Route].

b. <u>Flatness and Levelness Tolerances:</u> A traffic floor shall conform to the following surface profile tolerances:

Floor Flatness Number:  $F_F$ Specified Overall Value = [38] Minimum Local Value = [25] Floor Levelness Number:  $F_L$ Specified Overall Value = [25] Minimum Local Value = [17]

- c. <u>Floor Tolerance Measurements:</u>  $F_F$  and  $F_L$  tolerances shall be tested in accordance with ASTM E 1155. Actual overall F–numbers shall be calculated using the inferior / superior area method.
- d. <u>Timeliness of Floor Profile Tests & Reports:</u> All floor tolerance measurements shall be made within [48] hours after slab installation. In all cases, tolerance measurements shall precede the removal of shores and forms. Results of all floor profile tests (including a running tabulation of overall F<sub>F</sub> and F<sub>L</sub> values for all traffic slabs installed to date) shall be provided to the Contractor within [72] hours after each slab installation.
- e. Remedy for Out-of-Tolerance Work: For purposes of flatness and levelness control, minimum floor section boundaries shall coincide with the control joints. Profile test compliance requirements apply to the time period specified above only. Contractor shall remedy any floor section measuring below either the minimum local F<sub>F</sub>, or F<sub>L</sub> number. Any floor section measuring at or above both the minimum local F<sub>F</sub> and F<sub>L</sub> number shall be accepted. If actual overall F<sub>F</sub> or F<sub>L</sub> number for entire random-traffic floor installation measures less than its specified value, then Contractor shall undertake remedial measures acceptable to the Engineer.
- G. Defined random traffic floors [Non-accessible Routes] shall conform to the following surface profile tolerances:
  - a. <u>Floor Designation:</u> All floor areas specified as "defined random traffic floor" include only the [Non-accessible route].
  - b. <u>Flatness and Levelness Tolerances:</u> The defined traffic floor shall conform to the following surface profile tolerances:  $F_{min} = [25]$
  - c. Floor Tolerance Measurements:  $F_{min}$  tolerances shall be tested in accordance with ASTM E 1486.
  - d. <u>Timeliness of Floor Profile Tests & Reports:</u> All floor tolerance measurements shall be made by the Contractor within [24] hours after slab installation and before saw cutting of control joints. In all cases, tolerance measurements shall precede the removal of shores and forms. Results of all floor profile tests including a running tabulation of overall F<sub>min</sub> values for all of defined–traffic slabs installed to date shall be provided to the Contractor within [48] hours after each slab installation.
- H. Remedy for Out-of-Tolerance Work: For purposes of flatness and levelness control, minimum floor section boundaries shall coincide with the construction joints. Profile test compliance requirements apply to time period specified above only. Contractor shall remedy any floor section measuring below the  $F_{min}$  number, in accordance with recommendations of the Engineer. Any floor section measuring at or above the  $F_{min}$

Tetra Tech 213-207015-24001 number shall be accepted. If actual overall  $F_{min}$  number entire defined-traffic floor installation measures less than its specified value, then Contractor shall undertake remedial measures acceptable to the Engineer.

If a portion of a floor does not meet specified F-number, the following remedies are recommended:

- a. Local value is out of spec grind or replace floor.
- b. Overall value is out of spec Contractor shall pay the Owner per square foot for portion of floor not meeting F–number spec. This can be obtained by specifying a figure in project specifications in conjunction with square footage obtained from reading taken in the field.

## 1.8 REGULATORY REQUIREMENTS - OMITTED

## 1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

#### 1.10 GUARANTEE

A. Contractor shall guarantee the quality of materials and workmanship for a period of 12 months after acceptance. Defects discovered during this period shall be repaired by the Contractor at no cost to the Owner.

#### 1.11 TESTING

- A. Testing laboratory shall operate in accordance with ASTM D 3740 and E 329 and be acceptable to the Engineer.
- B. Testing laboratory and Project Engineer/Project Representative shall be given a minimum of 48 hours notice prior to taking any tests.
- C. Owner shall select and engage the testing laboratory. Testing laboratory shall be responsible to the Owner and Owner's Engineer. Payment for laboratory and all tests shall be by the Owner, except the Owner specifically reserves the right to deduct from the Contractor's payment, the expense and charges of the testing laboratory when:
  - 1. Contractor gives notice work is ready for inspection and testing, and fails to be ready for the test, and/or
  - 2. Testing of the Contractor's work, products, or materials fail, and retesting is required, and/or
  - 3. Contractor abuses the services or interferes with the work of the testing laboratory in the conduct of this work
- D. Test results shall be furnished to the Engineer prior to continuing with associated or subsequent work.

#### PART 2 – PRODUCTS

#### 2.1 FORM MATERIALS

- A. Wood or steel form material profiled to suit conditions.
- B. Joint Filler: ASTM D1751 type; 1/2 inch thick.

## 2.2 REINFORCEMENT

A. Welded Steel Wire Fabric: Plain type, ASTM A 185; uncoated finish.

# 2.3 CONCRETE MATERIALS

- A. Cement: ASTM C 150, Type I Normal.
- B. Fine and Coarse Mix Aggregates: ASTM C 33. Coarse aggregate shall consist of granite stone.
- C. Water: Potable, not detrimental to concrete.
- D. Air Entrainment: ASTM C 260.
- E. Chemical Admixture: ASTM C 494, Type A Water Reducing.

## 2.4 ACCESSORIES

- A. Curing Compound: ASTM C309, clear with fugitive dye.
- B. Sealant: Joints shall be sealed per detail on project drawings, conforming to ASTM C 920, Type S or M, Grade P or NS, Class 25.
- C. The vapor should be a minimum of 20 mil Polyethylene.

#### 2.5 CONCRETE MIX – BY PERFORMANCE CRITERIA

- A. Provide concrete to the following criteria:
  - 1. Flexible Strength: 700 psi.
  - 2. Compressive Strength: 4,000 psi @ 28 days.
  - 3. Slump: 3 inches.
- B. Use accelerating admixtures in cold weather only when accepted by Engineer. Use of admixtures will not relax cold weather placement requirements.
- C. Use calcium chloride only when accepted by Engineer.
- D. Use set retarding admixtures during hot weather only when accepted by Engineer.

# 2.6 SOURCE QUALITY CONTROL AND TESTS

- A. All sampling and testing services shall be performed, at Owner's expense, by a testing agency that operates in accordance with ASTM D 3740 and E 329 latest edition and accepted by the Engineer.
- B. Contractor shall submit to the Engineer a design mix on each class of concrete proposed for use. The mix shall be prepared by an accepted testing laboratory. Compressive strength of at least four specimens of the design mix shall indicate 15% higher than 28 days strengths specified. During the work, Contractor shall make three test cylinders for each 50 cubic yards, or fraction thereof, of concrete placed each day. One cylinder shall be tested at 7 days and the other two at 28 days in accordance with ASTM C 39. Copies of all test reports shall be furnished to the Engineer.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify subgrade conditions under provisions of Section 31 00 00 Earthwork.
- B. Verify compacted subgrade is acceptable and ready to support concrete and imposed loads.
- C. Verify gradients and elevations of subgrade are correct.

#### 3.2 CONSTRUCTION OBSERVATION

A. The Engineer or Project Representative will have the right to require any portion of the work be completed in their presence and if the work is covered up after such instruction, it shall be exposed by the Contractor for observation. However, if Contractor notifies the Engineer such work is scheduled, and Engineer fails to appear within 48 hours, the Contractor may proceed. All work completed and materials furnished shall be subject to review by the Engineer or Project Representative. Improper work shall be reconstructed. All materials, which do not conform to the requirements of the specifications, shall be removed from the work upon notice being received from Engineer for rejection of such materials. Engineer shall have the right to mark rejected materials to distinguish them as such.

#### 3.3 SUBGRADE

A. Prepare subgrade in accordance with Section 31 00 00 - Earthwork.

# 3.4 PREPARATION FOR PLACING

- A. Water shall be removed from excavations before concrete is deposited. Hardened concrete debris and other foreign materials shall be removed from the interior of forms and inside of mixing and conveying equipment. The reinforcement shall be made secure in position and shall be subject to examination and acceptance.
- B. Moisten subgrade to minimize absorption of water from fresh concrete.

- C. Coat surfaces of manhole, inlet, and catch basin frames with oil to prevent bond with concrete pavement.
- D. Notify Engineer minimum 48 hours prior to commencement of concreting operations.

#### 3.5 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler in position, in straight lines. Secure to formwork during concrete placement.
- D. Forms shall be constructed to the shape, line, and grade required and shall be maintained sufficiently rigid to prevent deformation under load. Form work and details of construction joints shall conform to ACI-318, Chapter 6.

#### 3.6 REINFORCEMENT

- A. Place reinforcement as indicated.
- B. Interrupt reinforcement at expansion joints.

#### 3.7 PLACING CONCRETE

- A. Placing of concrete shall conform to Chapter 5 of the American Concrete Institute Standard A.C.I. 318. Concrete having attained initial set or having contained water for more than 45-minutes shall not be used in the work. Concrete shall not be dropped freely more than 5-feet. Concrete shall be mixed and placed only when the temperature is at least 40 degrees F and rising. Concrete shall be placed only upon surfaces free from frost, ice, mud and other detrimental substances or conditions. When placed on dry soil or pervious material, waterproof paper or polyethylene sheeting shall be laid over surfaces to receive the concrete.
- B. Ensure reinforcement, formed joints and forms are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours so cold joints will not occur.
- D. Place concrete to elevations indicated on the contract drawings.

#### 3.8 JOINTS

- A. Place expansion joints at 50-foot intervals and radius points.
- B. Place contraction joints at 10-foot intervals. Align curb, gutter, and sidewalk joints.

- C. Place joint filler between paving components and building or other appurtenances. Recess top of filler 1/8 inch.
- D. Saw cut contraction joints 3/16-inch-wide at an optimum time after finishing. Cut 1/3 into depth of slab.

#### 3.9 FINISHING

- A. Sidewalk Paving: Light broom, radius to 1/4-inch radius, and trowel joint edges.
- B. Curbs and Gutters: Light broom parallel to gutter.
- C. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.
- D. Accessible Routes: Surfaces shall be stable, firm, and slip resistant. Slab Finish Tolerances Unless otherwise called out in the contract documents, finishes shall be true planes within 3/16-inch in 10-feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction. Maximum variation in elevation for a level slab shall not exceed quarter of an inch (1/4") over the entire slab or accessible route tolerances.
- E. Correct any depressions which will not drain.
- F. Visible surfaces and edges shall be free of blemishes, for marks, and tool marks, and shall be uniform in color, shape, and appearance.

## 3.10 JOINT SEALING

- A. Separate pavement from vertical surfaces with 1/2-inch-thick joint filler.
- B. Place joint filler in pavement pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- C. Extend joint filler from bottom of pavement to within 1/8 inch of finished surface.

#### 3.11 TOLERANCES

- A. Section 01 45 00 Quality Control: Tolerances.
- B. General Site Concrete:
  - 1. Maximum Variation of Surface Flatness: <sup>1</sup>/<sub>4</sub>-inch in 10-feet.
  - 2. Maximum Variation from True Position: 1/4-inch.
- C. Accessible Routes: Variation from design elevation shall not exceed ¼-inch; however, accessible routes shall not exceed maximum ADA allowable slopes. Contractor shall remove and replace all portions of the accessible route that exceeds maximum ADA allowable slopes.

## 3.12 CURB AND GUTTER SECTIONS

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- A. Shall be constructed as shown on the drawings and in accordance with applicable details. Subgrade below the curb and gutter sections shall be compacted to 98% density. Curb and gutter sections shall be constructed in sections of uniform length and shall not exceed 10-feet or be less than 5-feet in length. Straight edging along the edge of gutter and top of curb shall conform to those requirements for adjacent pavement but with no irregularities to exceed ¼-inch in 10-feet.
- B. If slip-form or extruded construction is used, contraction joints shall be located at intervals no greater than 10-feet by sawing the hardened concrete at the proper time. Joints shall be sawed between 4 to 8 hours after placing of concrete. Depth of saw-cut shall be one-fourth thickness of the curb and gutter section. The maximum width of cut shall be ½-inch. All joints shall be sawed in succession.
- C. Half inch thick premolded expansion joints shall be installed completely through the joints at spaces not to exceed 50-feet and at all structures and walks.
- D. When the curb forms are removed, backfill shall be immediately placed, tamped, and graded behind the new curb to help protect the line and grade. Machine methods of placing and forming may be used provided the finished product is satisfactory to the Engineer.
- E. Contractor shall place a concrete depressed curb at all driveways shown on the drawings or where a driveway is in use.
- F. Cracked curb and gutter will not be accepted.

## 3.13 CONCRETE CURING

- A. Immediately after placement and finishing, concrete shall be protected from moisture loss for not less than 7-days. For surfaces not in contact with forms, curing compound shall be uniformly applied after water sheen disappears from the concrete. Formed surfaces shall receive an application of curing compound if forms are removed during the 7-day curing period. Curing compound shall not be applied during rainfall.
- B. Curing compound shall be applied under pressure at the rate of 1 gallon per 150 square feet by mechanical sprayers. The spraying equipment shall be of the fully atomizing type. At the time of use, the compound shall be thoroughly mixed with a fugitive dye uniformly dispersed throughout the sprayer. Care shall be taken to prevent application to joints where concrete bond is required, to reinforcement steel and to joints where joint sealer is to be placed. The compound shall form a uniform continuous coherent film which will not crack or peel and shall be free from pinholes and other imperfections. Concrete surfaces subjected to heavy rainfall within 3-hours after curing compound has been applied shall be resprayed by above method and at above coverage at no additional expense to the Owner.
- C. No pedestrian or vehicular traffic shall be allowed over the surface for seven days unless surface is protected by planks, plywood, or sand. Protection shall not be placed until at least 12 hours after application of the curing compound.

D. Protect concrete by suitable methods to prevent damage by mechanical injury or excessively hot or cold temperatures.

# 3.14 FIELD QUALITY CONTROL

- A. Section 01 45 00 Quality Control: Field observations and testing.
- B. Three concrete test cylinders will be taken for every 50 or less cubic yards of each class of concrete placed each day.
- C. One additional test cylinder will be taken during cold weather and cured on site under same conditions as concrete it represents.
- D. One slump test will be taken for each set of test cylinders taken.
- E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken

#### 3.15 PROTECTION

- A. Immediately after placement, protect pavement from premature moisture loss, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit vehicular traffic over curb for seven days minimum after finishing. Do not permit pedestrian traffic over concrete for three days.

**END OF SECTION** 

#### SECTION 04 22 00 - CONCRETE UNIT MASONRY

#### PART 1 - GENERAL

#### 1.1 SUMMARY

#### A. Section Includes:

- 1. Concrete masonry units.
- 2. Decorative concrete masonry units.
- 3. Steel reinforcing bars.

# 1.2 DEFINITIONS

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

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.
- C. Samples: For each type and color of the following:
  - 1. Exposed CMUs.
  - 2. colored-aggregate mortar.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product. For masonry units, include data on material properties material test reports substantiating compliance with requirements.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
  - 1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
  - 2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.

## 1.5 QUALITY ASSURANCE

- A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 01 40 00 "Quality Requirements" for mockups.
  - 1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 36 inches high by full thickness.

### 1.6 FIELD CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

#### PART 2 - PRODUCTS

## 2.1 UNIT MASONRY, GENERAL

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

# 2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. Integral Water Repellent: Provide units made with integral water repellent for exposed units and where indicated.

- 1. <u>Manufacturers:</u> 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. ACM Chemistries.
  - b. Euclid Chemical Company (The); an RPM company.
  - c. GCP Applied Technologies Inc.
  - d. <u>Master Builders Solutions</u>.
  - e. Moxie International.

# C. CMUs: ASTM C90.

- 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of As indicated on Drawings.
- 2. Density Classification: Normal weight, unless otherwise indicated.
- D. Concrete Building Brick: ASTM C55.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength as indicated on Structural Drawings.
  - 2. Density Classification: Normal weight, unless otherwise indicated.
- E. Decorative CMUs: ASTM C90.
  - 1. <u>Manufacturers:</u> 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. York Building Products.
  - 2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength as indicated on Structural Drawings.
  - 3. Density Classification: Normal weight, unless otherwise indicated.
  - 4. Pattern and Texture:
    - a. Standard pattern, split-face finish. Match Architect's samples.

#### 2.3 CONCRETE LINTELS

A. Concrete Lintels: ASTM C1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.

#### 2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

- B. Colored Cement Products: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
  - 1. Colored Portland Cement-Lime Mix:
    - a. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) Holcim (US) Inc.
      - 2) <u>Lafarge North America Inc.</u>
      - 3) <u>Lehigh Hanson; HeidelbergCement Group</u>.
  - 2. Colored Masonry Cement:
    - a. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) <u>Cemex S.A.B. de C.V.</u>
      - 2) Essroc.
      - 3) Holcim (US) Inc.
      - 4) <u>Lafarge North America Inc.</u>
      - 5) <u>Lehigh Hanson; HeidelbergCement Group</u>.
- C. Aggregate for Mortar: ASTM C144.
  - 1. White-Mortar Aggregates: Natural white sand or crushed white stone.
  - 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- D. Aggregate for Grout: ASTM C404.
- E. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
  - 1. <u>Manufacturers:</u> 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. <u>Euclid Chemical Company (The)</u>; an RPM company.
    - b. GCP Applied Technologies Inc.
- F. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
  - 1. <u>Manufacturers:</u> 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. ACM Chemistries.
- b. Euclid Chemical Company (The); an RPM company.
- c. <u>GCP Applied Technologies Inc.</u>
- d. Master Builders Solutions.
- G. Water: Potable.

#### 2.5 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
  - 1. <u>Manufacturers:</u> 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. Heckmann Building Products, Inc.
    - b. Hohmann & Barnard, Inc.
    - c. Wire-Bond.
- C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.
  - 1. Interior Walls: Hot-dip galvanized, carbon steel.
  - 2. Exterior Walls: Hot-dip galvanized carbon steel.
  - 3. Wire Size for Side Rods: As indicated on Structural Drawings.
  - 4. Wire Size for Cross Rods: As indicated on Structural Drawings.
  - 5. Spacing of Cross Rods: Not more than 16 inches o.c.
  - 6. Provide in lengths of not less than 10 feet.

## 2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
  - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
  - 2. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
  - 3. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
  - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized-steel wire.

- 2. Tie Section: Triangular-shaped wire tie made from 0.25-inch-diameter, hot-dip galvanized-steel wire.
- C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
  - 1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch-thick steel sheet, galvanized after fabrication.
  - 2. Tie Section: Triangular-shaped wire tie made from 0.25-inch-diameter, hot-dip galvanized-steel wire.
  - 3. Corrugated-Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.060-inch-thick steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete.
- D. Partition Top Anchors: 0.105-inch-thick metal plate with a 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
  - 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A153/A153M.

#### 2.7 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
  - 1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch thick.
  - 2. Copper: ASTM B370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. weight or 0.0216 inch thick or ASTM B370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. weight or 0.0162 inch thick.
  - 3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
  - 4. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
  - 5. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
  - 6. Fabricate metal expansion-joint strips from stainless steel copper to shapes indicated.
- B. Flexible Flashing: Use the following unless otherwise indicated:
  - 1. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
    - a. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- 1) Hohmann & Barnard, Inc.
- Hyload, Inc. 2)
- Mortar Net Solutions. 3)
- 4) Wire-Bond.

#### 2.8 MISCELLANEOUS MASONRY ACCESSORIES

- Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; A. compressible up to 35 percent; of width and thickness indicated; formulated from PVC.
- Preformed Control-Joint Gaskets: Made from PVC, complying with ASTM D2287, Type PVC-B. 65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

#### 2.9 MORTAR AND GROUT MIXES

- General: Do not use admixtures, including pigments, air-entraining agents, accelerators, A. retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  - Do not use calcium chloride in mortar or grout. 1.
  - 2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.
  - For exterior masonry, use portland cement-lime or masonry cement mortar. 3.
  - For reinforced masonry, use portland cement-lime or masonry cement mortar. 4.
  - 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
  - For masonry below grade or in contact with earth, use Type as indicated on Structural 1. Drawings.
  - 2. For reinforced masonry, use Type as indicated on Structural Drawings.
  - For mortar parge coats, use Type as indicated on Structural Drawings.
  - For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for 4. interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
  - 5. For interior nonload-bearing partitions, Type O may be used instead of Type N.
- D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

- 1. Application: Use colored-aggregate mortar for exposed mortar joints with the following units:
  - a. Decorative CMUs.
  - b. Pre-faced CMUs.
- E. Grout for Unit Masonry: Comply with ASTM C476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
  - 2. Proportion grout in accordance with ASTM C476, as indicated on Structural Drawings.
  - 3. Provide grout with a slump as indicated on Structural Drawings, as measured in accordance with ASTM C143/C143M.

#### PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

# 3.2 TOLERANCES

#### A. Dimensions and Locations of Elements:

- 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
- 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
- 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

#### B. Lines and Levels:

- 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
- 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
- 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
- 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
- 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.

## C. Joints:

- 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
- 2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
- 3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

#### 3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- F. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

# 3.4 MORTAR BEDDING AND JOINTING

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

#### 3.5 MASONRY-CELL FILL

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

#### 3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
  - 1. Space reinforcement not more than 16 inches o.c.
  - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
  - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

#### 3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
  - 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
  - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
  - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

## 3.8 FLASHING

- A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.
- B. Install flashing as follows unless otherwise indicated:
  - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

- 2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
- 3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
- 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

#### 3.9 REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
  - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
  - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
  - 2. Limit height of vertical grout pours to not more than 60 inches.

#### 3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements is done at Contractor's expense.
- B. Inspections: Special inspections in accordance with Level B C in TMS 402/ACI 530/ASCE 5.
  - 1. Begin masonry construction only after inspectors have verified proportions of siteprepared mortar.

- 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
- 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.
- G. Mortar Test (Property Specification): For each mix provided, in accordance with ASTM C780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, in accordance with ASTM C1019.
- I. Prism Test: For each type of construction provided, in accordance with ASTM C1314 at seven days and at 28 days.

#### 3.11 PARGING

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

# 3.12 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
  - 2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

#### 3.13 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

- 1. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 22 00

#### SECTION 05 50 00 - METAL FABRICATIONS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

#### A. Section Includes:

- 1. Prefabricated building columns.
- 2. Shelf angles.
- 3. Metal ladders.
- 4. Structural-steel door frames.
- 5. Miscellaneous steel trim.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Fasteners.
  - 2. Shop primers.
  - 3. Shrinkage-resisting grout.
  - 4. Prefabricated building columns.
  - 5. Slotted channel framing.
  - 6. Manufactured metal ladders.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- C. Delegated-Design Submittal: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design ladders.

#### 2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

- 1. Size of Channels: 1-5/8 by 1-5/8 inches.
- 2. Material: Galvanized steel, ASTM A653/A653M, commercial steel, Type B structural steel, Grade 33, with G90 coating; 0.108-inch nominal thickness.

#### 2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  - 1. Provide stainless steel fasteners for fastening stainless steel.
  - 2. Provide bronze fasteners for fastening bronze.
- B. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

#### 2.4 MISCELLANEOUS MATERIALS

A. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

# 2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 8 inches from ends and corners of units and 24 inches o.c.

#### 2.6 PREFABRICATED BUILDING COLUMNS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
  - 1. Black Rock Column, Inc.
  - 2. Dean Lally L.P.
- B. General: Provide prefabricated building columns consisting of load-bearing structural-steel members protected by concrete fireproofing encased in an outer non-load-bearing steel shell. Fabricate connections to comply with details shown or as needed to suit type of structure indicated.

# 2.7 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.
  - 1. Provide mitered and welded units at corners.
  - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-inplace concrete.

#### 2.8 METAL LADDERS

#### A. General:

- 1. Comply with ANSI A14.3.
- 2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

#### B. Steel Ladders:

- 1. Space siderails 16 inches apart unless otherwise indicated.
- 2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
- 3. Rungs: 3/4-inch-diameter, steel bars.
- 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
- 5. Provide nonslip surfaces on top of each rung.
- 6. Galvanize ladders, including brackets.

#### 2.9 STRUCTURAL-STEEL DOOR FRAMES

- A. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Reinforce frames and drill and tap as necessary to accept finish hardware.
  - 1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.
- B. Galvanize steel frames.

#### 2.10 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
  - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize miscellaneous steel trim.

# 2.11 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Galvanize loose steel lintels located in exterior walls.

## 2.12 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

## 2.13 STEEL FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

#### PART 3 - EXECUTION

# 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

#### 3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor shelf angles securely to existing construction with expansion anchors.

## 3.3 INSTALLATION OF PREFABRICATED BUILDING COLUMNS

A. Install prefabricated building columns to comply with ANSI/AISC 360, "Specifications for Structural Steel Buildings," and with requirements applicable to listing and labeling for fire-resistance rating indicated.

# 3.4 REPAIRS

# A. Touchup Painting:

- 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

#### SECTION 05 58 13 - COLUMN COVERS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes snap-together metal column covers.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including finishing materials.
- B. Shop Drawings: Show fabrication and installation details for column covers.
- C. Samples: For each type of exposed finish required, prepared on 6-inch-square Samples of metal of same thickness and material indicated for the Work.

#### PART 2 - PRODUCTS

## 2.1 SNAP-TOGETHER COLUMN COVERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Basis of Design: PAC-CLAD Petersen, A Carlisle Company.
- B. Form column covers to shapes indicated from metal of type and minimum thickness indicated below. Return vertical edges and bend to form hook that engages continuous mounting clips.
  - 1. Aluminum Sheet: ASTM B209, with not less than strength and durability properties of Alloy 5005-H32, 0.063 inch thick.
    - a. Finish: High-performance organic coating.

#### 2.2 MISCELLANEOUS MATERIALS

- A. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined.
  - 1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

# B. Sound-Deadening Materials:

1. Insulation: Unfaced, mineral-fiber blanket insulation complying with ASTM C665, Type I, and passing ASTM E136 test.

- 2. Mastic: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- C. Backing Materials: Provided or recommended by column cover manufacturer.

#### 2.3 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 50 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

## PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Locate and place column covers plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install column covers.
  - 1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- B. Use concealed anchorages where possible.
- C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.
- D. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.

END OF SECTION 05 58 13

#### SECTION 06 10 00 - ROUGH CARPENTRY

#### PART 1 - GENERAL

#### 1.1 SUMMARY

#### A. Section Includes:

- 1. Rooftop equipment bases and support curbs.
- 2. Wood blocking, cants, and nailers.

#### 1.2 ACTION SUBMITTALS

#### A. Product Data:

- 1. For each type of process and factory-fabricated product.
- 2. For preservative-treated wood products.

#### 1.3 INFORMATIONAL SUBMITTALS

#### A. Material Certificates:

- 1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- 2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

## B. Evaluation Reports: For the following, from ICC-ES:

- 1. Wood-preservative-treated wood.
- 2. Fire-retardant-treated wood.
- 3. Power-driven fasteners.
- 4. Post-installed anchors.
- 5. Metal framing anchors.

#### PART 2 - PRODUCTS

#### 2.1 WOOD PRODUCTS, GENERAL

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.

#### B. Maximum Moisture Content:

1. Boards: 19 percent.

2. Dimension Lumber: 19 percent unless otherwise indicated.

## 2.2 PRESERVATIVE TREATMENT

- A. Preservative Treatment by Pressure Process: AWPA U1; 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. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, blocking, and similar concealed members in contact with masonry or concrete.

#### 2.3 FIRE-RETARDANT-TREATMENT

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Exterior Type: Treated materials shall comply with requirements specified above for fireretardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
  - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.

- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:
  - 1. Concealed blocking.
  - 2. Plywood backing panels.

## 2.4 MISCELLANEOUS LUMBER

- A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Rooftop equipment bases and support curbs.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
  - 1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
  - 2. Eastern softwoods; No. 2 Common grade; NeLMA.
  - 3. Northern species; No. 2 Common grade; NLGA.
  - 4. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

#### 2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

#### 2.6 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

#### 2.7 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cleveland Steel Specialty Co.
  - 2. MiTek Industries, Inc.
  - 3. Phoenix Metal Products, Inc.
  - 4. Simpson Strong-Tie Co., Inc.
  - 5. Tamlyn.
- B. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
  - 1. Use for interior locations unless otherwise indicated.

# 2.8 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets:
  - 1. Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

#### PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

- C. Do not splice structural members between supports unless otherwise indicated.
- D. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- E. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- F. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  - 2. ICC-ES evaluation report for fastener.

# 3.2 PROTECTION

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

END OF SECTION 06 10 00

#### SECTION 06 16 00 - SHEATHING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

#### A. Section Includes:

- 1. Wall sheathing.
- 2. Subflooring.
- 3. Underlayment.
- 4. Sheathing joint and penetration treatment.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
  - 1. Fire-retardant-treated plywood.

#### PART 2 - PRODUCTS

#### 2.1 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 according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Exterior Type: Treated materials shall comply with requirements specified above for fireretardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
  - 2. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.

- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat all plywood unless otherwise indicated.

#### 2.2 WALL SHEATHING

- A. Plywood Sheathing: DOC PS 1, Exterior sheathing.
- B. Glass-Mat Gypsum Sheathing: ASTM C1177/C1177M.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Certainteed; SAINT-GOBAIN.
    - b. Continental Building Products, LLC.
    - c. Georgia-Pacific Gypsum LLC.
    - d. National Gypsum Company.
    - e. USG Corporation.
  - 2. Type and Thickness: Regular, 1/2 inch thick.

#### 2.3 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Combination Subfloor-Underlayment: DOC PS 1, Exposure 1, Structural I, Underlayment single-floor panels.
- B. Plywood Subflooring: DOC PS 1, Exposure 1, Structural I single-floor panels or sheathing.
- C. Underlayment: Provide underlayment in nominal thicknesses indicated or, if not indicated, not less than 1/4 inch over smooth subfloors and not less than 3/8 inch over board or uneven subfloors.
  - 1. Particleboard Underlayment: ANSI A208.1, Grade PBU.

# 2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
  - 2. For wall sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.

# 2.5 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

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

# 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 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
  - 2. ICC-ES evaluation report for fastener.
- D. Coordinate wall 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.

#### 3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Subflooring:

- a. Glue and nail to wood framing.
- b. Screw to cold-formed metal framing.
- c. Space panels 1/8 inch apart at edges and ends.

# 2. Underlayment:

- a. Nail to subflooring.
- b. Space panels 1/32 inch apart at edges and ends.

## 3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
  - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
  - 2. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
  - 3. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Seal sheathing joints according to sheathing manufacturer's written instructions.
  - 1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

# 3.4 PARTICLEBOARD UNDERLAYMENT INSTALLATION

- A. Comply with CPA's recommendations for type of subfloor indicated. Fill and sand gouges, gaps, and chipped edges. Sand uneven joints flush.
  - 1. Fastening Method: Glue and nail underlayment to subflooring.

END OF SECTION 06 16 00

#### SECTION 07 21 00 - THERMAL INSULATION

#### PART 1 - GENERAL

#### 1.1 SUMMARY

### A. Section Includes:

- 1. Polyisocyanurate foam-plastic board insulation.
- 2. Glass-fiber blanket insulation.
- 3. Glass-fiber board insulation.

# 1.2 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Polyisocyanurate foam-plastic board insulation.
  - 2. Glass-fiber blanket insulation.
  - Glass-fiber board insulation.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Installer's Certification: Listing type, manufacturer, and R-value of insulation installed in each element of the building thermal envelope.
  - 1. Sign, date, and post the certification in a conspicuous location on Project site.
- B. Product test reports.
- C. Research reports.

#### PART 2 - PRODUCTS

#### 2.1 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

- A. Polyisocyanurate Board Insulation, Foil Faced: ASTM C1289, foil faced, Type I, Class 1 or 2.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Atlas Roofing Corporation Molded Polystyrene.
    - b. DuPont de Nemours, Inc.
    - c. Johns Manville; a Berkshire Hathaway company.
    - d. Remax, Inc.

- 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- 3. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

#### 2.2 GLASS-FIBER BLANKET INSULATION

- A. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I; passing ASTM E136 for combustion characteristics.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. CertainTeed LLC; Saint-Gobain North America.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Owens Corning.
  - 2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
  - 3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
  - 4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- B. Glass-Fiber Blanket Insulation, Polypropylene-Scrim-Kraft Faced: ASTM C665, Type II (nonreflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier).
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. CertainTeed LLC; Saint-Gobain North America.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Owens Corning.
  - 2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- C. Glass-Fiber Blanket Insulation, Kraft Faced: ASTM C665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. CertainTeed LLC; Saint-Gobain North America.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Owens Corning.

- 2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- D. Glass-Fiber Blanket Insulation, Reinforced-Foil Faced: ASTM C665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. CertainTeed LLC; Saint-Gobain North America.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Owens Corning.
  - 2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- E. Glass-Fiber Blanket Insulation, Foil Faced: ASTM C665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. CertainTeed LLC; Saint-Gobain North America.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Knauf Insulation.
    - d. Owens Corning.
  - 2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

# 2.3 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
  - 1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
  - 2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
- B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.
- C. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

#### PART 3 - EXECUTION

# 3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Install insulation with manufacturer's R-value label exposed after insulation is installed.
- D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

#### 3.2 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

#### 3.3 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors.
- C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

# 3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

- 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
- 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
- 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
- 4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
- 5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- 6. For wood-framed construction, install blankets according to ASTM C1320 and as follows:
  - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- 7. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
  - a. Exterior Walls: Set units with facing placed toward as indicated on Drawings.
  - b. Interior Walls: Set units with facing placed as indicated on Drawings.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
  - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
  - 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

END OF SECTION 07 21 00

#### SECTION 07 21 19 - FOAMED-IN-PLACE INSULATION

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Closed-cell spray polyurethane foam.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research reports.

# PART 2 - PRODUCTS

#### 2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM

- A. Closed-Cell Spray Polyurethane Foam: ASTM C1029, Type II, minimum density of 1.5 lb/cu. ft. and minimum aged R-value at 1-inch thickness of 6.2 deg F x h x sq. ft./Btu at 75 deg F.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Carlisle Spray Foam Insulation.
    - b. Gaco Western LLC.
    - c. HUNTSMAN BUILDING SOLUTIONS (formerly Demilec, Icynene, Lapolla).
    - d. Icynene-Lapolla; Icynene.
    - e. NCFI Polyurethanes; a division of Barnhardt Manufacturing Company.
  - 2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 450 or less.
  - 3. Fire Propagation Characteristics: Passes NFPA 285 and NFPA 276 testing as part of an approved assembly.

# PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.
- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

END OF SECTION 07 21 19

#### SECTION 07 25 00 - WEATHER BARRIERS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Flexible flashing.
  - 2. Drainage material.

#### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For flexible flashing, from ICC-ES.

# PART 2 - PRODUCTS

#### 2.1 FLEXIBLE FLASHING

- A. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. DuPont de Nemours, Inc.
    - b. GCP Applied Technologies Inc.
    - c. Protecto Wrap Company.
    - d. Raven Industries, Inc.
    - e. TYPAR.
  - 2. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

# 2.2 DRAINAGE MATERIAL

A. Drainage Material: Product shall maintain a continuous open space between water-resistive barrier and exterior cladding to create a drainage plane and shall be used under siding adhered masonry.

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
  - a. Advanced Building Products Inc.
  - b. DuPont de Nemours, Inc.
  - c. Insulfoam; Carlisle Construction Materials Company.
  - d. Keene Building Products.
  - e. Mortar Net Solutions.
- 2. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

#### PART 3 - EXECUTION

#### 3.1 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
  - 1. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
  - 2. Lap flashing over water-resistive barrier at bottom and sides of openings.
  - 3. Lap water-resistive barrier over flashing at heads of openings.

# 3.2 DRAINAGE MATERIAL INSTALLATION

A. Install drainage and flashing to comply with manufacturer's written instructions.

END OF SECTION 07 25 00

#### SECTION 07 27 26 - FLUID-APPLIED MEMBRANE AIR BARRIERS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Vapor-retarding, fluid-applied air barriers.

#### 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For air-barrier assemblies.
  - 1. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.
- C. Field quality-control reports.

# 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to set quality standards for materials and execution.
  - 1. Build integrated mockups of exterior wall assembly as directed by the architect, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

- a. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.
- b. Include junction with roofing membrane foundation wall intersection.

#### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E2357.

# 2.2 MEDIUM-BUILD AIR BARRIERS, VAPOR RETARDING

- A. Medium-Build, Vapor-Retarding Air Barrier: Synthetic polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 17 to 30 mils over smooth, void-free substrates.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Master Builders Solutions.
    - b. PROSOCO, Inc.
    - c. TK Products.

# 2. Physical and Performance Properties:

- a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E2178.
- b. Vapor Permeance: Maximum 0.1 perm; ASTM E96/E96M, Desiccant Method.
- c. Ultimate Elongation: Minimum 350 percent; ASTM D412, Die C.
- d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D4541.
- e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- f. UV Resistance: Can be exposed to sunlight for 90 days according to manufacturer's written instructions.

#### 2.3 ACCESSORY MATERIALS

A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars,

termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

#### PART 3 - EXECUTION

#### 3.1 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- D. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- F. Bridge isolation joints, expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

#### 3.2 INSTALLATION

- A. Install materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
  - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
  - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
  - 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
  - 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

- C. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
- D. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.
- E. Medium-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.
  - Vapor-Retarding, Medium-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, applied in one or more equal coats. Apply additional material as needed to achieve void- and pinhole-free surface.
- F. Do not cover air barrier until it has been tested and inspected by testing agency.
- G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

# 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: As determined by testing agency from among the following tests:
  - 1. Air-barrier dry film thickness.
  - 2. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E1186, chamber pressurization or depressurization with smoke tracers.
  - 3. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E783.
  - 4. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D4541 for each 600 sq. ft. of installed air barrier or part thereof.
- C. Air barriers will be considered defective if they do not pass tests and inspections.
  - 1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
  - 2. Remove and replace deficient air-barrier components for retesting as specified above.
- D. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
- E. Prepare test and inspection reports.

# 3.4 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
- B. Remove masking materials after installation.

END OF SECTION 07 27 26

#### SECTION 07 42 13.13 - FORMED METAL WALL PANELS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Concealed-fastener, lap-seam metal wall panels.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: For each type of metal panel indicated.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranties: Samples of special warranties.

#### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

# 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

#### 1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

#### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 1.57 lbf/sq. ft..
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 2.86 lbf/sq. ft..
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

# 2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

- A. Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and a flat pan between panel edges; with flush joint between panels.
  - 1. Manufacturer:
    - a. Basis of Design: PAC-CLAD Peterson, A Carlisle Company

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- 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, structural quality. Prepainted by the coilcoating process to comply with ASTM A755/A755M.
  - a. Nominal Thickness: 0.028 inch.
  - b. Exterior Finish: Two-coat fluoropolymer.
  - c. Color: As selected by Architect from manufacturer's full range.
- 3. Panel Coverage: 12 inches.
- 4. Panel Height: 1.0 inch.
- C. Box-Rib-Profile, Concealed-Fastener Metal Wall Panels: Formed with raised, box-shaped ribs, evenly spaced across panel width, and with rib/recess sides angled 60 degrees or more.
  - 1. Manufacturer:
    - a. Basis of Design: PAC-CLAD Peterson, A Carlisle Company
  - 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
    - a. Nominal Thickness: 0.028 inch.
    - b. Exterior Finish: Two-coat fluoropolymer.
    - c. Color: As selected by Architect from manufacturer's full range.
  - 3. Rib Spacing Profile: 12 inches
  - 4. Panel Coverage Length: 48 inches.
  - 5. Panel Height: 1.5 inches.

#### 2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
  - 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
  - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Rainscreen Clip Fasteners: Clips designed to withstand design loads.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch wide and 1/8 inch thick.
  - 2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

#### 2.4 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

#### 2.5 FINISHES

#### A. Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.

#### PART 3 - EXECUTION

# 3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

#### 3.2 INSTALLATION

- A. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
  - 1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
  - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
  - 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
  - 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
  - 5. Flash and seal panels with weather closures at perimeter of all openings.

#### B. Watertight Installation:

- 1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
- 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
- 3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

#### 3.3 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On

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completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 07 42 13.13

#### SECTION 07 42 93 - SOFFIT PANELS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Metal soffit panels.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: For each type of metal panel indicated.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Warranties: Samples of special warranties.

#### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

#### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
  - 1. Wind Loads: As indicated on Drawings.
  - 2. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 1.57 lbf/sq. ft..
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 2.86 lbf/sq. ft..
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

# 2.2 METAL SOFFIT PANELS

- A. Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Metal Soffit Panels: Match profile and material of metal wall panels.
  - 1. Finish: Match finish and color of metal wall panels.
- C. Reveal-Joint-Profile Metal Soffit Panels: Solid panels formed with vertical panel edges and a flat pan between panel edges; with recessed reveal joint between panels.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Berridge Manufacturing Company.
    - b. Firestone Building Products.
    - c. Merchant and Evans.
  - 2. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

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a. Thickness: 0.032 inch.b. Surface: Smooth, flat finish.

c. Exterior Finish: Two-coat fluoropolymer.

d. Color: As selected by Architect from manufacturer's full range.

3. Panel Coverage: 12 inches.4. Panel Height: 0.75 inch.

#### 2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
  - 1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/8 inch thick.
  - 2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

#### 2.4 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

#### 2.5 FINISHES

#### A. Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

#### PART 3 - EXECUTION

#### 3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

# 3.2 INSTALLATION

- A. Metal Soffit Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
  - 1. Apply panels and associated items true to line for neat and weathertight enclosure.
  - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
  - 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
  - 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

#### B. Watertight Installation:

- 1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
- 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
- 3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

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- C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

#### 3.3 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 07 42 93

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# SECTION 07 54 19 - POLYVINYL-CHLORIDE (PVC) ROOFING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

#### A. Section Includes:

- 1. Adhered polyvinyl chloride (PVC) roofing system.
- 2. Substrate board.
- 3. Vapor retarder.
- 4. Roof insulation.
- 5. Cover board.
- 6. Walkways.

# 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.
- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
  - 1. Layout and thickness of insulation.
  - 2. Base flashings and membrane terminations.
  - 3. Flashing details at penetrations.
  - 4. Tapered insulation thickness and slopes.
  - 5. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
  - 6. Tie-in with air barrier.
- C. Samples: For the following products:
  - 1. Roof membrane and flashing, of color required.
  - 2. Walkway pads or rolls, of color required.
- D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates:
  - 1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

- a. Submit evidence of compliance with performance requirements.
- 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- B. Product Test Reports: For roof membrane and insulation, tests performed by independent qualified testing agency indicating compliance with specified requirements.
- C. Research reports.
- D. Field Test Reports:
  - 1. Concrete internal relative humidity test reports.
- E. Field quality-control reports.
- F. Sample warranties.

# 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

# 1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

#### 1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 20 years from date of Substantial Completion.

# PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
- B. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

- C. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- D. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:
  - 1. Zone 2 (Roof Area Perimeter): 90 lbf/sq. ft.
    - a. Location: From roof edge to inside roof edge.
- E. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.
  - 1. Fire/Windstorm Classification: Class 1A-120.
  - 2. Hail-Resistance Rating: FM Global Property Loss Prevention Data Sheet 1-34 MH.
- F. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.
  - 1. Wind Uplift Load Capacity: 90 psf.
- G. ENERGY STAR Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- H. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- I. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

# 2.2 POLYVINYL CHLORIDE (PVC) ROOFING

- A. PVC Sheet: ASTM D4434/D4434M, Type II, reinforced, fabric backed.
  - 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. Sika Sarnafil
    - b. IB Roofing Systems
    - c. Soprema
    - d. Johns Manville, A Berkshire Hathaway Company
    - e. Carlisle SynTec Incorporated.
  - 2. Thickness: 60 mils.
  - 3. Exposed Face Color: White.

# 2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- D. Low-Rise, Urethane, Fabric-Backed Membrane Adhesive: Roof system manufacturer's standard spray-applied, low-rise, two-component urethane adhesive formulated for compatibility and use with fabric-backed membrane roofing.
- E. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

# 2.4 SUBSTRATE BOARDS

- A. Substrate Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum substrate or ASTM C1278/C1278M, fiber-reinforced gypsum board.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Certainteed; SAINT-GOBAIN.
    - b. Georgia-Pacific Gypsum LLC.
    - c. National Gypsum Company.
    - d. USG Corporation.
  - 2. Thickness: Type X, 5/8 inch.
  - 3. Surface Finish: Factory primed.
- B. Substrate Board: ASTM C728, perlite board, sealed coated.
  - 1. Thickness: 3/4 inch.
- C. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

# 2.5 ROOF INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Atlas Roofing Corporation.
    - b. Carlisle SynTec Incorporated.
    - c. Firestone Building Products.
    - d. GAF.
    - e. Johns Manville; a Berkshire Hathaway company.
  - 2. Size: 48 by 48 inches.
  - 3. Thickness:
    - a. Base Layer: 1-1/2 inches.
    - b. Upper Layer: 3-1/2 inches.
- B. Tapered Insulation: Provide factory-tapered insulation boards.
  - 1. Material: Match roof insulation.
  - 2. Minimum Thickness: 1/4 inch.
  - 3. Slope:
    - a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
    - b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

#### 2.6 INSULATION ACCESSORIES

- A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
- B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
  - 1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
- C. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum board or ASTM C1278/C1278M fiber-reinforced gypsum board.
  - 1. Manufacturers: Subject to compliance with requirements, 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.

- 2. Thickness: 1/2 inch.
- 3. Surface Finish: Factory primed.

## 2.7 ASPHALT MATERIALS

- A. Roofing Asphalt: ASTM D312/D312M, Type III or Type IV.
- B. Asphalt Primer: ASTM D41/D41M.

## 2.8 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads, approximately 3/16 inch thick and acceptable to roofing system manufacturer.
  - 1. Size: Approximately 36 by 60 inches.
  - 2. Color: Contrasting with roof membrane.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
  - 1. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 05 31 00 "Steel Decking."

# 3.2 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 07 27 26 "Fluid-Applied Membrane Air Barriers."

#### 3.3 INSTALLATION OF SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, with end joints staggered not less than 24 inches in adjacent rows.
  - 1. At steel roof decks, install substrate board at right angle to flutes of deck.

- a. Locate end joints over crests of steel roof deck.
- 2. Tightly butt substrate boards together.
- 3. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
- 4. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

## 3.4 INSTALLATION OF INSULATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Metal Decking:
  - 1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows.
    - a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
    - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
      - 1) Trim insulation so that water flow is unrestricted.
    - e. Fill gaps exceeding 1/4 inch with insulation.
    - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
  - 2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.
    - a. Staggered end joints within each layer not less than 24 inches in adjacent rows.
    - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
    - e. Trim insulation so that water flow is unrestricted.
    - f. Fill gaps exceeding 1/4 inch with insulation.
    - g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
      - 1) Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

## 3.5 INSTALLATION OF COVER BOARDS

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.
  - 1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
  - 2. At internal roof drains, conform to slope of drain sump.
    - a. Trim cover board so that water flow is unrestricted.
  - 3. Cut and fit cover board tight to nailers, projections, and penetrations.
  - 4. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav listed roof assembly requirements for specified Windstorm Resistance Classification and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
    - a. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

## 3.6 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel Owner's testing and inspection agency.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- F. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.
- G. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- H. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- I. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.
  - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
  - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.

- 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- J. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

## 3.7 INSTALLATION OF BASE FLASHING

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

## 3.8 INSTALLATION OF WALKWAYS

- A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.
  - 1. Install flexible walkways at the following locations:
    - a. Perimeter of each rooftop unit.
    - b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
    - c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
    - d. Locations indicated on Drawings.
    - e. As required by roof membrane manufacturer's warranty requirements.
  - 2. Provide 6-inch clearance between adjoining pads.
  - 3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

## 3.9 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

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- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 54 19

#### SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

## PART 1 - GENERAL

## 1.1 SUMMARY

#### A. Section Includes:

- 1. Formed low-slope roof sheet metal fabrications.
- 2. Formed wall sheet metal fabrications.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each of the following
  - 1. Underlayment materials.
  - 2. Elastomeric sealant.
  - 3. Butyl sealant.
  - 4. Epoxy seam sealer.
- B. Shop Drawings: For sheet metal flashing and trim.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
  - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
  - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
  - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
  - 6. Include details of termination points and assemblies.
  - 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
  - 8. Include details of roof-penetration flashing.
  - 9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
  - 10. Include details of special conditions.
  - 11. Include details of connections to adjoining work.
- C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested.

- B. Evaluation Reports: For copings and roof edge flashing, from ICC-ES showing compliance with ANSI/SPRI/FM 4435/ES-1.
- C. Sample warranty.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Special warranty.

## 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
  - 1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

#### 1.6 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
    - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- D. SPRI Wind Design Standard: Manufacture and install copings roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
  - 1. Design Pressure: As indicated on Drawings.
- E. FM Approvals Listing: Manufacture and install copings roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-120. Identify materials with name of fabricator and design approved by FM Approvals.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Stainless Steel Sheet: ASTM A240/A240M, Type 304, dead soft, fully annealed; with smooth, flat surface.
  - 1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).

## 2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. ATAS International, Inc.
    - b. Carlisle WIP Products; a brand of Carlisle Construction Materials.
    - c. GCP Applied Technologies Inc.
    - d. Henry Company.

- e. Owens Corning.
- f. Polyglass U.S.A., Inc.
- g. Protecto Wrap Company.
- h. SDP Advanced Polymer Products Inc.
- 2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.

#### 2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
  - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
    - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
  - 2. Fasteners for Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
  - 3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
  - 4. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
  - 5. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.

## C. Solder:

1. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.

## 2.5 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
  - 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
  - 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

- 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
- 4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
- 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

## B. Fabrication Tolerances:

- 1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- 2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
  - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

## G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

## 2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long sections. Furnish with 6-inch-wide, joint cover plates.
  - 1. Fabricate from the following materials:
    - a. Stainless Steel: 0.0188 inch thick.
- B. Copings: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, solder or weld watertight.

- 1. Fabricate from the following materials:
  - a. Stainless Steel: 0.0250 inch thick.
- C. Base Flashing: Fabricate from the following materials:
  - 1. Stainless Steel: 0.0188 inch thick.
- D. Counterflashing: Fabricate from the following materials:
  - 1. Stainless Steel: 0.0188 inch thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
  - 1. Stainless Steel: 0.0188 inch thick.
- F. Roof-Drain Flashing: Fabricate from the following materials:
  - 1. Stainless Steel: 0.0156 inch thick.

## 2.7 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
  - 1. Stainless Steel: 0.0156 inch thick.
- B. Drip Edges: Fabricate from the following materials:
  - 1. Stainless Steel: 0.0156 inch thick.

## 2.8 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch-high, end dams. Fabricate from the following materials:
  - 1. Stainless Steel: 0.0156 inch thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:
  - 1. Stainless Steel: 0.0156 inch thick.

## PART 3 - EXECUTION

## 3.1 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering, High-Temperature Sheet Underlayment:
  - 1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
  - 2. Prime substrate if recommended by underlayment manufacturer.
  - 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
  - 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
  - 5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
  - 6. Roll laps and edges with roller.
  - 7. Cover underlayment within 14 days.

## 3.2 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
  - 1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, sealant.
  - 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
  - 5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
  - 6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  - 7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
  - 8. Do not field cut sheet metal flashing and trim by torch.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressuretreated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
  - 1. Coat concealed side of stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
  - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

- 1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
- 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- 3. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
  - 1. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.
  - 2. Do not solder metallic-coated steel sheet.
  - 3. Do not pretin zinc-tin alloy-coated copper.
  - 4. Do not use torches for soldering.
  - 5. Heat surfaces to receive solder, and flow solder into joint.
    - a. Fill joint completely.
    - b. Completely remove flux and spatter from exposed surfaces.
  - 6. Stainless Steel Soldering:
    - a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
    - b. Promptly remove acid-flux residue from metal after tinning and soldering.
    - c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
- G. Rivets: Rivet joints in zinc where necessary for strength.

#### 3.3 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.
  - 1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
  - 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing:
  - 1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
  - 2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

 Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

# C. Copings:

- 1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
- 2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.
  - a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.
  - b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.
- 3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
  - 1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
  - 2. Extend counterflashing 4 inches over base flashing.
  - 3. Lap counterflashing joints minimum of 4 inches.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

#### 3.4 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

#### 3.5 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

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## 3.6 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

## 3.7 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 07 62 00

## SECTION 07 71 00 - ROOF SPECIALTIES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Copings.
  - 2. Roof-edge specialties.
  - 3. Reglets and counterflashings.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For roof specialties.
  - 1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
- C. Samples: For each type of roof specialty and for each color and texture specified.

# 1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For tests performed by a qualified testing agency.
- B. Sample warranty.

## 1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

## 1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class.

## 1.6 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

- 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
  - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
  - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
  - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
- 2. Finish Warranty Period: 20 years from date of Substantial Completion.

#### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. FM Approvals' Listing: Manufacture and install copings roof-edge specialties that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, As indicated on Drawings. Identify materials with FM Approvals' markings.
- B. SPRI Wind Design Standard: Manufacture and install copings roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:
  - 1. Design Pressure: As indicated on Drawings.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 COPINGS

- A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Architectural Products Company.
    - b. ATAS International, Inc.
    - c. Berridge Manufacturing Company.
    - d. Castle Metal Products.
    - e. Cheney Flashing Company.
    - f. Drexel Metals.
    - g. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
    - h. Perimeter Systems; a division of SAF.
    - i. SAF (Southern Aluminum Finishing Company, Inc.).

- 2. Formed Aluminum Sheet Coping Caps: Aluminum sheet, thickness as required to meet performance requirements.
  - a. Surface: Smooth, flat finish.
  - b. Finish: Two-coat flouropolymer.
  - c. Color: As selected by Architect from manufacturer's full range.
- 3. Corners: Factory mitered and soldered.
- 4. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material.
  - a. Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.
  - b. Face-Leg Cleats: Concealed, continuous galvanized-steel sheet.

## 2.3 ROOF-EDGE SPECIALTIES

- A. Canted Roof-Edge Fascia and Gravel Stop: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed galvanized-steel sheet cant, 0.028 inch thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Architectural Products Company.
    - b. ATAS International, Inc.
    - c. Berridge Manufacturing Company.
    - d. Castle Metal Products.
    - e. Cheney Flashing Company.
    - f. Drexel Metals.
    - g. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
    - h. SAF (Southern Aluminum Finishing Company, Inc.).
  - 2. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, thickness as required to meet performance requirements.
    - a. Surface: Smooth, flat finish.
    - b. Finish: Two-coat fluoropolymer.
    - c. Color: As selected by Architect from manufacturer's full range.
  - 3. Corners: Factory mitered and soldered.
  - 4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
  - 5. Fascia Accessories: Fascia extenders with continuous hold-down cleats.
- B. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure roof membrane. Provide matching corner units.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. ATAS International, Inc.
  - b. Berridge Manufacturing Company.
  - c. Drexel Metals.
  - d. Exceptional Metals.
  - e. Perimeter Systems; a division of SAF.
- 2. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, thickness as required to meet performance requirements.
  - a. Surface: Smooth, flat finish.
  - b. Finish: Two-coat fluoropolymer.
  - c. Color: As selected by Architect from manufacturer's full range.
- 3. Corners: Factory mitered and soldered.
- 4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
- 5. Receiver: Manufacturer's standard material and thickness.
- 6. Fascia Accessories: Fascia extenders with continuous hold-down cleats.
- C. One-Piece Gravel Stops: Manufactured, one-piece, metal gravel stop in section lengths not exceeding 12 feet, with a horizontal flange and vertical leg fascia terminating in a drip edge, and concealed splice plates of same material, finish, and shape as gravel stop. Provide matching corner units.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Architectural Products Company.
    - b. Berridge Manufacturing Company.
    - c. Castle Metal Products.
    - d. Cheney Flashing Company.
    - e. Drexel Metals.
    - f. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
    - g. Perimeter Systems; a division of SAF.
    - h. SAF (Southern Aluminum Finishing Company, Inc.).
  - 2. Formed Aluminum Sheet Gravel Stops: Aluminum sheet, thickness as required to meet performance requirements.
    - a. Surface: Smooth, flat.
    - b. Finish: Two-coat fluoropolymer.
    - c. Color: As selected by Architect from manufacturer's full range.
  - 3. Corners: Factory mitered and soldered.
  - 4. Accessories: Fascia extenders with continuous hold-down cleats.

## 2.4 REGLETS AND COUNTERFLASHINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ATAS International, Inc.
  - 2. Berridge Manufacturing Company.
  - 3. Castle Metal Products.
  - 4. Cheney Flashing Company.
  - 5. Drexel Metals.
  - 6. Exceptional Metals.
  - 7. Fry Reglet Corporation.
  - 8. Heckmann Building Products, Inc.
  - 9. Keystone Flashing Company, Inc.
  - 10. Metal-Era, Inc.
  - 11. OMG, Inc.
- B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
  - 1. Zinc-Coated Steel: Nominal 0.022-inch thickness.
  - 2. Formed Aluminum: 0.024 inch thick.
  - 3. Corners: Factory mitered and soldered.
  - 4. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
  - 5. Concrete Type, Embedded: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
  - 6. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
  - 7. Multiuse Type, Embedded: For multiuse embedment in masonry mortar joints.
- C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
  - 1. Zinc-Coated Steel: Nominal 0.022-inch thickness.
  - 2. Formed Aluminum: 0.024 inch thick.

#### D. Accessories:

- 1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
- 2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
- E. Aluminum Finish: Two-coat fluoropolymer.

1. Color: As selected by Architect from manufacturer's full range.

## 2.5 MATERIALS

A. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

## 2.6 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ATAS International, Inc.
    - b. Carlisle WIP Products; a brand of Carlisle Construction Materials.
    - c. Owens Corning.
    - d. Polyglass U.S.A., Inc.
    - e. Protecto Wrap Company.
    - f. SDP Advanced Polymer Products Inc.
  - 2. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F.
  - 3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F.
- B. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- C. Slip Sheet: Rosin-sized building paper, 3-lb/100 sq. ft. minimum.

## 2.7 MISCELLANEOUS MATERIALS

- A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
  - 1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
  - 2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
  - 3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
- B. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- C. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

## 2.8 FINISHES

## A. Coil-Coated Galvanized-Steel Sheet Finishes:

- 1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A755/A755M and coating and resin manufacturers' written instructions.
  - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.

#### B. Coil-Coated Aluminum Sheet Finishes:

- 1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.

## PART 3 - EXECUTION

## 3.1 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
  - 1. Apply continuously under copings roof-edge specialties and reglets and counterflashings.
  - 2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.
- B. Felt Underlayment: Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- C. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

## 3.2 INSTALLATION, GENERAL

A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder,

protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

- 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
- 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
- 3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
- 4. Torch cutting of roof specialties is not permitted.
- 5. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  - 1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
  - 2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
  - 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
  - 2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

# 3.3 INSTALLATION OF COPING

- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.

#### 3.4 INSTALLATION OF ROOF-EDGE SPECIALITIES

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

## 3.5 INSTALLATION OF REGLETS AND COUNTERFLASHINGS

- A. Embedded Reglets: See Section 04 20 00 "Unit Masonry" for installation of reglets.
- B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.
- C. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant. Fit counterflashings tightly to base flashings.

## 3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 07 71 00

## SECTION 07 71 29 - MANUFACTURED ROOF EXPANSION JOINTS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Flanged bellows-type roof expansion joints.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For roof expansion joints.
- C. Samples: For each exposed product and for each color specified.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification data.
- B. Product test reports.
- C. Sample warranty.

## 1.4 QUALITY ASSURANCE

A. Installer Qualifications: Installer of roofing membrane.

## 1.5 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace roof expansion joints and components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof expansion joints that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Rating: Comply with ASTM E1966 or UL 2079; testing by a qualified testing agency to resist the spread of fire and to accommodate building thermal and seismic movements without impairing its ability to resist the passage of fire and hot gases. Identify products with appropriate markings of applicable testing agency.
  - 1. Rating: Not less than fire-resistance rating of the roof assembly.
  - 2. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

## 2.2 FLANGED BELLOWS-TYPE ROOF EXPANSION JOINTS

- A. Flanged Bellows-Type Roof Expansion Joint: Factory-fabricated, continuous, waterproof joint cover consisting of exposed membrane bellows laminated to flexible, closed-cell support foam, and secured along each edge to 3- to 4-inch-wide metal flange.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC.
    - b. Balco; a CSW Industrials Company.
    - c. BASF Corp. Watson Bowman Acme Corp.
    - d. C/S Group.
    - e. Inpro Corporation.
    - f. Johns Manville; a Berkshire Hathaway company.
    - g. MM Systems Corporation.
    - h. Nystrom.
  - 2. Source Limitations: Obtain flanged bellows-type roof expansion joints approved by roofing manufacturer and that are part of roofing membrane warranty.
  - 3. Bellows: PVC flexible membrane, nominal 60 mils thick.
  - 4. Flanges: Stainless steel, 0.0188 inch thick.
  - 5. Corner, Intersection, and Transition Units: Provide factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints.
  - 6. Accessories: Provide splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation.
  - 7. Secondary Seal: Continuous, waterproof membrane within joint and attached to substrate on sides of joint below the primary bellows assembly.
    - a. Thermal Insulation: Fill space above secondary seal with manufacturer's standard, factory-installed mineral-fiber insulation per architectural drawings; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84.
  - 8. Fire Barrier: Manufacturer's standard fire barrier for fire-resistance-rated expansion joint system.

## B. Materials:

- 1. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
- 2. PVC Membrane: ASTM D4434/D4434M, type standard with manufacturer for application.

## 2.3 MISCELLANEOUS MATERIALS

- A. Adhesives: As recommended by roof-expansion-joint manufacturer.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
  - 1. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being fastened.

## PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions for handling and installing roof expansion joints.
  - 1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.
  - 2. Install roof expansion joints true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
  - 3. Provide for linear thermal expansion of roof-expansion-joint materials.
- B. Directional Changes: Install factory-fabricated units at directional changes to provide continuous, uninterrupted, and watertight joints.
- C. Splices: Splice roof expansion joints to provide continuous, uninterrupted, and waterproof joints.
  - 1. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal membrane.
- D. Fire Barrier: Install fire barrier as required by manufacturer to provide continuous, uninterrupted fire resistance throughout length of roof expansion joint, including transitions and end joints.
- E. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

## END OF SECTION 07 71 29

## SECTION 07 72 00 - ROOF ACCESSORIES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Roof curbs.
  - 2. Roof hatches.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory.
- B. Shop Drawings: For roof accessories.
- C. Samples: For each exposed product and for each color and texture specified.

## 1.3 INFORMATIONAL SUBMITTALS

A. Sample warranties.

## 1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

# 1.5 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

## 2.1 ROOF CURBS

A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, straight sides, and integrally formed deckmounting flange at perimeter bottom.

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
  - a. AES Industries, Inc.
  - b. Air Balance; a division of MESTEK, Inc.
  - c. LMCurbs
  - d. Roof Products and Systems (RPS); a division of Hart & Cooley, Inc.
  - e.
  - f. Thybar Corporation.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Material: Zinc-coated (galvanized) steel sheet, 0.052 inch thick.
  - 1. Finish: Factory prime coating.
  - 2. Color: As selected by Architect from manufacturer's full range.

## D. Construction:

- 1. Curb Profile: Profile as indicated on Drawings compatible with roofing system.
- 2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
- 3. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
- 4. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange or by use of leveler frame.
- 5. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
- 6. Insulation: Factory insulated with 1-1/2-inch-thick glass-fiber board insulation.
- 7. Liner: Same material as curb, of manufacturer's standard thickness and finish.
- 8. Nailer: Factory-installed wood nailer along top flange of curb, continuous around curb perimeter.
- 9. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
- 10. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch-thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
- 11. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.
- 12. Security Grille: Provide where indicated.
- 13. Damper Tray: Provide damper tray or shelf with opening 3 inches.

# 2.2 ROOF HATCHES

A. Roof Hatches: Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and

weathertight perimeter gasketing, straight sides, and integrally formed deck-mounting flange at perimeter bottom.

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
  - a. AES Industries, Inc.
  - b. BILCO Company (The).
- 2. Type and Size: Single-leaf lid, 30 by 36 inches.
- 3. Loads: Minimum 40-lbf/sq. ft. external live load and 30-lbf/sq. ft. internal uplift load.
  - a. When release is actuated, lid shall open against 10-lbf/sq. ft. snow or wind load and lock in position.
- 4. Curb, Framing, and Lid Material: Zinc-coated (galvanized) steel sheet.
  - a. Thickness: Manufacturer's standard thickness for hatch size indicated.
  - b. Color: As selected by Architect from manufacturer's full range.
- 5. Construction:
  - a. Insulation: 2-inch-thick, polyisocyanurate board.
    - 1) R-Value: 2.78 according to ASTM C1363.
  - b. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
  - c. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
  - d. Hatch Lid: Glazed, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
  - e. Exterior Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
  - f. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
  - g. Security Grille: Provide for all units.
- 6. Hardware: Manufacturer's standard corrosion resistant; with hinges, hold-open devices, and independent manual-release devices for inside and outside operation of lids.

## 2.3 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation.
  - 1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
- B. Stainless Steel Sheet and Shapes: ASTM A240/A240M or ASTM A666, Type 304.

C. Steel Shapes: ASTM A36/A36M, hot-dip galvanized according to ASTM A123/A123M unless otherwise indicated.

## 2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.
- C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.
- D. Security Grilles: 3/4-inch diameter, ASTM A1011/A1011M steel bars spaced 6 inches o.c. in one direction and 12 inches o.c. in the other, shop-primed for field finish.
- E. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
- F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- G. Elastomeric Sealant: ASTM C920, elastomeric polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- H. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

## PART 3 - EXECUTION

# 3.1 INSTALLATION

- A. Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.
  - 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
  - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
  - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
  - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  - 1. Coat concealed side of roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
- C. Security Grilles: Weld bar intersections and, using tamper-resistant bolts, attach the ends of bars to structural frame or primary curb walls.
- D. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

## 3.2 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 09 91 13 "Exterior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 72 00

## SECTION 07 92 00 - JOINT SEALANTS

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section Includes:

- 1. Silicone joint sealants.
- 2. Nonstaining silicone joint sealants.
- 3. Mildew-resistant joint sealants.

## 1.2 ACTION SUBMITTALS

- A. Product data.
- B. Samples: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Joint-sealant schedule.

# 1.3 INFORMATIONAL SUBMITTALS

- A. Field Quality-Control Submittals:
  - 1. Field-Adhesion-Test Reports: For each sealant application tested.
- B. Sample warranties.

## 1.4 CLOSEOUT SUBMITTALS

- A. Warranty Documentation:
  - 1. Manufacturers' special warranties.
  - 2. Installer's special warranties.

## 1.5 QUALITY ASSURANCE

# A. Qualifications:

- 1. Installers: Authorized representative who is trained and approved by manufacturer.
- 2. Testing Agency: Qualified in accordance with ASTM C1021 to conduct the testing indicated.

## 1.6 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
  - 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  - 2. Disintegration of joint substrates from causes exceeding design specifications.
  - 3. Mechanical damage caused by individuals, tools, or other outside agents.
  - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

# 2.1 JOINT SEALANTS, 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 joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

## 2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Adfast
    - b. GE Construction Sealants; Momentive Performance Materials Inc.
    - c. Sika Corporation; Joint Sealants.

# 2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Adfast.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.
    - c. Pecora Corporation.
    - d. Sika Corporation; Joint Sealants.
    - e. The Dow Chemical Company.
    - f. Tremco Incorporated.

## 2.4 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Adfast.
    - b. GE Construction Sealants; Momentive Performance Materials Inc.
    - c. Pecora Corporation.
    - d. Soudal USA.
    - e. The Dow Chemical Company.
    - f. Tremco Incorporated.

## 2.5 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Adfast.
    - b. Alcot Plastics Ltd.
    - c. Construction Foam Products; a division of Nomaco, Inc.
    - d. Master Builders Solutions.

- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin); Type O (open-cell material), 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. Provide self-adhesive tape where applicable.

#### 2.6 MISCELLANEOUS MATERIALS

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

## PART 3 - EXECUTION

# 3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants 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, 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.
  - 3. Remove laitance and form-release agents from concrete.
  - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

## 3.2 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 C1193 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 in subparagraphs 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 profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.
- G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- H. 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, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

## 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
  - 1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
    - a. Extent of Testing: Test completed and cured sealant joints as follows:
      - 1) Perform 10 tests for the first 1000 ft. of joint length for each kind of sealant and joint substrate.
      - 2) Perform one test for each 1000 ft. of joint length thereafter or one test per each floor per elevation.
    - b. Test Method: Test joint sealants in accordance with Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
      - 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.
    - c. Inspect tested joints and report on the following:
      - 1) Whether sealants filled joint cavities and are free of voids.
      - 2) Whether sealant dimensions and configurations comply with specified requirements.
      - 3) 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 kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
    - d. 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 material, sealant configuration, and sealant dimensions.
    - e. 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.
  - 2. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to

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comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

C. Prepare test and inspection reports.

END OF SECTION 07 92 00

Tetra Tech 213-207015-24001

## SECTION 07 92 19 - ACOUSTICAL JOINT SEALANTS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Acoustical joint sealants.

## 1.2 ACTION SUBMITTALS

- A. Product data.
- B. Samples: Manufacturer's color charts consisting of strips of cured sealants, showing full range of available colors for each product exposed to view.
- C. Acoustical joint-sealant schedule.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Test and Evaluation Reports:
  - 1. Product test reports.
- B. Sample warranties.

## 1.4 CLOSEOUT SUBMITTALS

- A. Warranty Documentation:
  - 1. Manufacturers' special warranties.
  - 2. Installer's special warranties.

#### 1.5 WARRANTY

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

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

## PART 2 - PRODUCTS

## 2.1 ACOUSTICAL JOINT SEALANTS

- A. Acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies in accordance with ASTM E90.
- B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C834.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Accumetric LLC.
    - b. Everkem Diversified Products, Inc.
    - c. Franklin International.
    - d. GE Construction Sealants; Momentive Performance Materials Inc.
    - e. Grabber Construction Products.
    - f. Hilti, Inc.
    - g. OSI Sealants; Henkel Corporation.
    - h. Pecora Corporation.
    - i. Serious Energy Inc.
    - j. Specified Technologies, Inc.
    - k. Tremco Incorporated.
    - 1. USG Corporation.
  - 2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.

## 2.2 MISCELLANEOUS MATERIALS

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

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where recommended by acoustical joint-sealant manufacturer. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

#### 3.3 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C919, ASTM C1193, and manufacturer's written instructions for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

END OF SECTION 07 92 19

#### SECTION 07 95 13.13 - INTERIOR EXPANSION JOINT COVER ASSEMBLIES

## PART 1 - GENERAL

## 1.1 SUMMARY

A. Section includes interior expansion joint cover assemblies.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each expansion joint cover assembly.
  - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams.
- C. Samples: For each expansion joint cover assembly and for each color and texture specified.

## PART 2 - PRODUCTS

## 2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E1966 by a qualified testing agency.
  - 1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.
- C. Expansion Joint Design Criteria:
  - 1. Type of Movement: Thermal Wind sway.

- a. Nominal Joint Width: As indicated on Drawings.
- 2. Type of Movement: Seismic.
  - a. Joint Movement: As indicated on Drawings.

## 2.3 FLOOR EXPANSION JOINT COVERS

- A. Metal-Plate Floor Joint Cover: Metal cover plate fixed on one side of joint gap and free to slide on other.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC.
    - b. Balco; a CSW Industrials Company.
    - c. BASF Corp. Watson Bowman Acme Corp.
    - d. Construction Specialties, Inc.
    - e. Inpro Corporation.
    - f. MM Systems Corporation.
    - g. Nystrom.
  - 2. Application: Floor to floor / Floor to wall.
  - 3. Installation: Surface mounted.
  - 4. Load Capacity:
    - a. Uniform Load: 50 lb/sq. ft..
    - b. Concentrated Load: 300 lb.
    - c. Maximum Deflection: 0.0625 inch.
  - 5. Fire-Resistance Rating: Not less than that indicated on Drawings.
  - 6. Cover-Plate Design: Serrated.
  - 7. Exposed Metal:
    - a. Aluminum: Manufacturer's standard.
      - 1) Color: As selected by Architect from full range of industry colors and color densities.

## 2.4 WALL EXPANSION JOINT COVERS

- A. Metal-Plate Wall Joint Cover: Metal cover plate fixed on one side of joint gap and free to slide on other.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC.

- b. Balco; a CSW Industrials Company.
- c. BASF Corp. Watson Bowman Acme Corp.
- d. Construction Specialties, Inc.
- e. Inpro Corporation.
- f. MM Systems Corporation.
- g. Nystrom.
- 2. Application: Wall to wall / Wall to corner.
- 3. Fire-Resistance Rating: Not less than that indicated on Drawings.
- 4. Exposed Metal:
  - a. Aluminum: Manufacturer's standard.
    - 1) Color: As selected by Architect from full range of industry colors and color densities.

## 2.5 CEILING EXPANSION JOINT COVERS

- A. Glide-Plate Ceiling Joint Cover: Assembly consisting of center plate that slides in and out of slots in metal frames fixed to sides of joint gap.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC.
    - b. Balco; a CSW Industrials Company.
    - c. BASF Corp. Watson Bowman Acme Corp.
    - d. Construction Specialties, Inc.
    - e. Inpro Corporation.
    - f. MM Systems Corporation.
    - g. Nystrom.
  - 2. Application: Ceiling to ceiling / Wall to ceiling.
  - 3. Fire-Resistance Rating: Not less than that indicated on Drawings.
  - 4. Exposed Metal:
    - a. Aluminum: Manufacturer's standard.
      - 1) Color: As selected by Architect from full range of industry colors and color densities.

## 2.6 MATERIALS

- A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.

- C. Fire Barriers: Any material or material combination, to comply with performance criteria for required fire-resistance rating.
- D. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.
- E. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M.

## 2.7 ALUMINUM FINISHES

A. Mill finish.

#### 2.8 ACCESSORIES

- A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.
  - 1. Provide where indicated on Drawings.
- B. Manufacturer's standard attachment devices, as indicated or required for complete installations.

#### PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies.
- C. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- D. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
  - 1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
  - 2. Install frames in continuous contact with adjacent surfaces.
    - a. Shimming is not permitted.
  - 3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
  - 4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
  - 5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.

- 6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- E. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
  - 1. Provide in continuous lengths for straight sections.
  - 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
  - 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- F. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- G. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.
- H. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
  - 1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.
- I. Moisture Barrier Drainage: If indicated, provide drainage fittings and connect to drains.

## 3.2 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete.
- B. Protect the installation from damage by work of other Sections.

END OF SECTION 07 95 13.13

## SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

## PART 1 GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Work under this section comprises of furnishing hollow metal doors and frames, including transom frames, sidelight and window frames with provision for glazed, paneled or louvered openings, fire labeled and non-labeled, as scheduled.
  - 1. Flush Steel Doors.
  - 2. Steel frames.
- B. Related Sections: Related documents, drawings and general provisions of contract, including General and Supplementary Conditions and Division 01 specification sections apply to this section. The latest published edition of each reference applies.
  - 1. Section 06 10 00 Rough Carpentry
  - 2. Section 08 71 00 Door Hardware
  - 3. Section 08 80 00 Glazing
  - 4. Section 09 91 23 Interior Painting
- C. References: The intent of this document is that all hollow metal and its application will comply or exceed the standards identified below. The latest published edition of each reference applies.
  - 1. ANSI American National Standards Institute ansi.org
  - 2. NFPA National Fire Protection Association
    - a. NFPA 80 Standard for Fire Doors and Other Opening Protectives
    - b. NFPA 101 Life Safety Code
    - c. NFPA 105 Standard Smoke Door Assemblies and Other Opening Protectives
    - d. NFPA 252 Standard Method of Fire Tests of Door Assemblies.
  - 3. DHI Door and Hardware Institute Door Security + Safety Professionals
    - a. Installation Guide for Doors and Hardware.
    - b. Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.
    - c. Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames.
  - 4. SDI Steel Door Institute
    - a. SDI-105 Recommended Erection Instructions for Steel Frames
    - b. SDI-107 Hardware on Steel Doors (Reinforcement Application)
    - c. SDI-111 Recommended Details for Standard Steel Doors, Frames, Accessories, and Related Components
    - d. SDI-117 Manufacturing Tolerances Standard Steel Doors and Frames
    - e. SDI-118 Basic Fire Door Requirements
    - f. SDI A250.3 Test Procedure and Acceptance Criteria for Factory Applied Finish

- Coatings for Steel Doors and Frames
- g. SDI A250.4 Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, and Frame Anchors
- h. SDI A250.6 Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames
- i. SDI A250.8 SDI-100 Specifications for Standard Steel Doors and Frames
- j. SDI A250.10 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
- k. SDI A250.11 Recommended Erection Instructions for Steel Frames
- 5. BHMA Builders Hardware Manufacturers Association
  - a. BHMA A156.115 Hardware Preparations in Standard Steel Doors and Frames.
  - b. BHMA A156.7 Hinge Template Dimensions.
- 6. ASTM American Society for Testing Materials
  - a. ASTM A568/A568M-19a Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements
  - b. ASTM A879/A879M-12(2017) Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
  - c. ASTM A653/A653M-19a Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - d. ASTM A924/A924M-19 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
  - e. ASTM A1008/A1008M-18 Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
- 7. ICC International Code Counsel
  - a. ICC A117.1 Accessible and Usable Building and Facilities.
  - b. ICC 500 Standard for the Design and Construction of Storm Shelters
- 8. UL Building Materials Directory; Underwriters Laboratories Inc.
  - a. UL 10B Standard for Neutral Pressure Fire Tests of Door Assemblies
  - b. UL 10C Standard for Positive Pressure Fire Tests of Door Assemblies
  - c. UL 1784 Air Leakage Test of Door Assemblies
  - d. UL 752 Standard for Bullet-Resisting Equipment
- 9. NAAMM/HMMA National Association of Architectural Metal Manufacturers/Hollow Metal Manufacturers Association
  - a. NAAMM/HMMA 840 Guide Specification for Receipt, Storage, and Installation of Hollow Metal Doors and Frames.
- 10. WH Certification Listings; Warnock Hersey International Inc.
- 1.2 SUBSTITUTIONS:

A. All substitution requests must be submitted within the procedures and time frame as outlined in Division 1, General Requirements. Approval of products is at the discretion of the architect and their consultant

#### 1.3 SUBMITTALS

- A. Submittals to comply with provisions of Division 01, Submittal Procedures.
- B. Product Data: Manufacturer's standard details and catalog data indicating compliance with referenced standards and manufacturer's installation instructions.
- C. Shop Drawings: Provide a schedule of doors and frames using same reference numbers for details and door openings as those on the contract documents. Shop drawings should include the following information to ensure doors and frames are properly prepared and coordinated to receive hardware.
  - 1. Elevations of each door and frame type.
  - 2. Details for door core.
  - 3. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
  - 4. Locations of cutouts for glass and louvers.
  - 5. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  - 6. Mounting locations for hardware.
  - 7. Thickness of reinforcement/preparations for hardware.
  - 8. Details of anchorages, joints, field splices, and connections.
  - 9. Details of accessories.
  - 10. Details of moldings, removable stops, and glazing.
  - 11. Fire ratings.
  - 12. Finish.
- D. Closeout Submittals to comply with Division 1, Closeout Submittals procedures.
- E. Furnish copies of manufacturer's warranty information and maintenance instructions.

## 1.4 QUALITY ASSURANCE

- A. Hollow Metal Distributor is to be a direct account of the manufacturer of the products furnished. In addition, that distributor must have in their regular employment an Architectural Hardware Consultant (AHC), Certified Door Consultant (CDC), an Architectural Openings Consultant (AOC), a Door & Hardware Consultant (DHC) or equivalent door and hardware industry experience who will be available to consult with the Architect and Contractor regarding any matters affecting the door and frame opening.
- B. Manufacturer Qualifications: Certified Member of the Steel Door Institute in good standing.
- C. Installer: Minimum five years documented experience installing products specified this Section.
- D. Certificates:
  - 1. Manufacturer's certification that products comply with referenced standards.
  - 2. Hollow Metal Manufacturer must provide documentation that they are an SDI Certified Manufacturer.

- E. Fire Rated Doors and Frames: Underwriters' Laboratories, Intertek Testing Services/Warnock Hersey, and Factory Mutual labeled fire doors and frames:
  - 1. Provide labeled fire doors and frames in accordance with Underwriters Laboratories standard UL10C Positive Pressure Fire Tests of Door Assemblies.
  - 2. Construct and install doors and frames to comply with current issue of NFPA 80.
  - 3. Manufacture Underwriters' Laboratories labeled doors and frames in strict compliance to UL procedures, and provide the degree of fire protection, heat transmission and panic loading capability indicated by the opening class.
  - 4. Manufacture Intertek Testing Services /Warnock Hersey labeled doors and frames in strict compliance to ITS/WH procedures and provide the degree of fire protection capability indicated by the opening class.
  - 5. Affix a physical label or approved marking to each fire door and/or fire door frame, at an authorized facility as evidence of compliance with procedures of the labeling agency.
  - 6. Conform to applicable codes for fire ratings. It is the intent of this specification that doors, frames, hardware and their application comply or exceed the standards for labeled openings. In case of conflict between types required for fire protection, furnish type required by NFPA and UL.
  - 7. Provide Temperature Rise Fire Door Assemblies in exit enclosures and exit passageway with maximum transmitted temperature end point rating of not more than 250 degrees F (121 degrees C) above ambient at the end of 30 minutes of the standard fire test exposure.
  - 8. For openings required to be fire rated exceeding limitations of labeled assemblies, submit manufacturer's certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.

## 1.5 DELIVERY, STORAGE, AND HANDLING

## A. Packing and Shipping

- 1. The use of non-vented plastic or canvas shelters that can create a humidity chamber shall be avoided to prevent rust or damage.
- 2. Provide cardboard wrapped or crated product to provide protection during transit and job site storage
- 3. Should wrappers become wet, remove immediately

## B. Delivery and Site Acceptance

- 1. The supplier shall deliver all materials to the project site; direct factory shipments are not allowed unless agreed upon beforehand. Supplier shall coordinate delivery times and schedules with the contractor.
- 2. Deliver doors cardboard wrapped or crated to provide protection during transit and job site storage. Provide additional protection to prevent damage to any factory-finished doors. Mark all doors and frames with architects opening numbers as shown on the contract documents and shop drawings on the center hinge preparation location.
- 3. Upon delivery, check in doors and frames jointly with supplier. Inspect doors and frames upon delivery for damage, correct quantities or shortages. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to the architect. Otherwise, remove and replace damaged goods as directed. Note shortages and replace immediately.

## C. Storage and Protection

- Handle, store and protect products in accordance with the manufacturers printed instructions, ANSI/SDI A250.8 – Specifications for Standard Steel Doors and Frames, A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames, or ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames and NAAMM/HMMA 840 – Guide Specification for Receipt, Storage, and Installation of Hollow Metal Doors and Frames.
- 2. Store all materials in a dry area. All hollow metal material shall be stored so that it does not come in contact with water or moisture. Protect units from adverse weather elements.
- 3. Place units on 4 inch (102 mm) high wood sills to prevent rust and damage.
- 4. Store doors vertically under a properly vented cover, five units maximum in a stack with a <sup>1</sup>/<sub>4</sub>" space between doors to permit air circulation.
- 5. Store frames in an upright position with heads uppermost under cover.
- 6. Store assembled frames five units maximum in a stack with 2-inch (51 mm) space between frames to permit air circulation.

## 1.6 COORDINATION

- A. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware, electric devices and recessed items.
- B. Coordinate Work with frame opening construction, door and hardware installation.
- C. Sequence installation to accommodate required door hardware.
- D. Verify field dimensions for factory assembled frames prior to fabrication.

## 1.7 WARRANTY

- A. Comply with Division 01 Closeout Submittals
- B. All doors and frames shall be warranted in writing by the manufacturer against defects in materials and workmanship for a period of one (1) year commencing on the date of manufacture.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Basis of Design MESKER a dormakaba Brand, Web: http://meskerdoor.com
  - 1. Acceptable Manufacturer Curries an ASSA Abloy Company
  - 2. Acceptable Manufacturer Steelcraft an Allegion Company
- B. Substitutions: Not permitted.
- C. Provide all steel doors and frames from a single SDI certified manufacturer.

## 2.2 GENERAL:

- A. Physical performance: Units shall comply with the 1 million cycles swing test requirement per ANSI A250.4 Level A.
- B. Finishing:
  - 1. Prime Gray to meet SDI A250.10
- C. Electrical Requirements: Coordinate all electrical requirements for doors and frames. Make provisions for installation of electrical items so that wiring can be readily removed and replaced.
  - 1. Provide cutouts and reinforcements required for metal doors and frames to accept electric components.
  - 2. Frame with Electrical Hinges: Junction box welded over center hinge reinforcing. Top or bottom hinge locations are not permitted.
  - 3. Coordinate with Section 08 71 00 (or Division 28) for electrified hardware items.

#### 2.3 DOORS

- A. General: Construct exterior/interior doors to the following designs and gauges:
  - 1. Exterior Doors: Zinc-Iron Alloy-Coated galvannealed steel A60:
    - a. Thickness:
      - 1) 16 gauge
    - b. Provide flush top/closed top channel for exterior swing-out doors to eliminate moisture penetration. Galvannealed steel top caps are permitted.
  - 2. Interior Doors: Cold-rolled steel, ASTM A 1008/A 1008M:
    - a. Thickness:
      - 1) 16 gauge
  - 3. Door Thickness: 1-3/4 inches
  - 4. Vertical edge seams: Provide doors with continuous vertical mechanical inter-locking joints at lock and hinge edges. Finish edges as follows:
    - a. Welded Vertical Edges: Continuous vertical weld and pressed smooth with no putty or filler.
  - 5. Bevel hinge and lock door edges 1/8 inch (3 mm) in 2 inches (50 mm).
  - 6. Reinforce top and bottom of doors with galvannealed 16 gauge minimum, welded to both panels.
  - 7. Fire Rating: Supply door units bearing Labels for fire ratings indicated in Door Schedule for the locations indicated.
  - 8. Core Adhesion System Basis of design Moisture Cure Polyurethane Hot Melt:
    - a. Adhesives are to cure completely, meaning once set, they cannot be re-melted and will not soften or freeze and lose adhesion.
    - b. Adhesive system will have an enhanced resistance to flame spread in its cured state

- designed to pass UL 10C, Positive Pressure Fire Tests of Door Assemblies.
- c. Bonded assemblies will withstand prolonged exposure from -35°F(-37°C) to 200°F (93°C) temperatures without exhibiting any signs of bond failure.
- d. Cured adhesive film will remain flexible to allow for differences in thermal expansion and contraction of various substrates without sacrificing bond performance.

#### 9. Core Material

- a. HDP High Density Polystyrene
- 10. Glass moldings and stops:
  - a. Fabricate from 18 gauge minimum steel:
  - b. Install trim into the door as a four-sided welded assembly with mitered, reinforced and welded corners.
  - c. Trim: identical on both sides of the door.
  - d. Labeled and non-labeled doors: use the same trim to match esthetics.
  - e. Channeling requirements:
    - 1) Cutouts larger than 36" in height require 18 gauge perimeter channelings in the cutout of the door prior to installation of the lite kit our louver.

## 11. Hardware Reinforcements:

- a. Doors shall be mortised and adequately reinforced per the manufacturers guidelines for all hardware. Required mortise hardware reinforcements shall be drilled and tapped at the factory. Surface applied hardware shall be field drilled by hardware installer.
- b. Hinge reinforcements for full mortise hinges: minimum 7 gauge with an extra long, high frequency top hinge reinforcement as a standard feature.
- c. Lock reinforcements: minimum 16 gauge.
- d. Closer reinforcements: minimum 14 gauge steel.
- e. Projection welded hinge and lock reinforcements to the edge of the door.
- f. Provided adequate reinforcements for other hardware as required.

## B. Full Flush Doors:

1. Basis of Design: Mesker NV Series.

## 2.4 DOOR FRAMES

- A. General: Construct exterior/interior metal door frames to the following designs and gauges;
  - 1. Exterior Frames: Zinc-Iron Alloy-Coated galvannealed steel (A40) (A60) or Zinc-Coated Galvanized steel (G90) that conforms to ASTM A 653/A653M:
    - a. Thickness:
      - 1) 14 gauge.
  - 2. Interior Frames in Masonry: Zinc-Iron Alloy-Coated galvannealed steel (A40) (A60) or Zinc-Coated Galvanized steel (G90) that conforms to ASTM A 653/A653M:

- a. Thickness:
  - 1) 14 gauge.
- 3. Interior Frames in stud wall construction: cold rolled steel, ASTM A 1008/A 1008M.
  - a. Thickness:
    - 1) 14 gauge.
- B. Flush Steel Frames:
  - 1. Basis of Design: Mesker F-Series.
  - 2. Profile:
    - a. Face:
      - 1) 2 Inches face dimension and types and throat dimensions indicated on the Door Schedule.
      - 2) Custom special face dimension and types and throat dimensions indicated on the Door Schedule.
    - b. Stops:
      - 1) Standard 5/8-inch-high stops
      - 2) Kerf style stops: 5/8-inch-high stops w/ 1/8-inch kerf slot positioned in the side of the stop.
      - 3) Thermal break w/ kerf stops: 5/8 inch-high stops. Steel used to make the stop on the frame will connect to the steel on the rabbet through a material that allows for a thermal break. A kerf slot for gasketing to be built into the thermal break.
  - 3. Provide reinforcements and accessories for specified hardware per SDI 250.6.
  - 4. Anchors: Locate adjustable anchors in each jamb 6 inches from the top of the door opening to hold frame in rigid alignment.
    - a. Strap anchors welded to frame
  - 5. Fire Rating: Supply frame units bearing Labels for fire ratings indicated in Door Schedule for the locations indicated.
  - 6. Accessories:
    - a. Glazing Bead: Formed steel sheet; screw-attached.
    - b. Steel Panels:
      - 1) 1/2-inch 1 inch thick and manufactured from 18 gauge or 16 gauge thick non-galvannealed or galvannealed steel faces with a polystyrene core.
      - 2) 1-3/4 inches thick and manufactured from 18 gauge or 16 gauge thick non-galvannealed or galvannealed steel faces with a steel stiffened core for fire rated openings.
  - 7. Fire Rating: Provide factory assembled welded units bearing Labels for fire ratings indicated on the Drawings.

#### 2.5 ACCESSORIES

- A. Anchors: Manufacturer's standard framing anchors, specified in manufacturer's printed installation instructions for project conditions.
- B. Astragals for pairs of doors: Manufacturer's standard for labeled and non-labeled openings.
- C. Plaster Guards: Same material as door frame, minimum 24 gauge (0.5 mm) minimum; provide for all strike boxes. Plaster guards not mandatory on interior after set frames.
- D. Silencers: Resilient rubber, Inserted type, three per strike jamb for single openings. Stick-on silencers shall not be permitted except on hollow metal framing systems.
- E. Glazing: Specified in Section 08 80 00 "Glazing"

## 2.6 FABRICATION

## A. Steel Frames:

- 1. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.
  - a. Clearances shall comply with the requirements of NFPA 80.
- 2. Factory-welded frames: Head and jamb intersecting corners mitered at 45 degrees, with back welded joints ground smooth.
  - a. Continuous face weld the joint between the head and jamb faces along their length either internally or externally. Grind, prime paint, and finish smooth face joints with no visible face seams
- 3. Provide temporary steel spreaders (welded to the jambs at each rabbet of door openings) on welded frames during shipment. Remove temporary steel spreaders prior to installation of the frame.
- B. Tolerances shall comply with SDI-117 "Manufacturing Tolerances for Standard Steel Doors and Frames."
- C. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold-rolled or hot-rolled steel sheet.
- D. Unless otherwise indicated, provide exposed fasteners with countersunk flat or oval heads for exposed screws and bolts.
- E. Prepare doors and frames to receive mortised and concealed hardware per final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI-107 and ANSI-A115 Series specifications for door and frame preparation for hardware.

- F. Reinforce doors and frames to receive surface-applied hardware per SDI A250.6. Drilling and tapping for surface-applied hardware shall be done at Project site. Provide internal reinforcements for all doors to receive door closers and exit devices where scheduled.
- G. Locate hardware as indicated on Shop Drawings or, if not indicated, per the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

## 2.7 FINISHES

- A. Chemical Treatment: Treat steel surfaces to promote paint adhesion.
- B. Exposed door and frame surfaces to be cleaned and treated then coated with rust inhibitive primer. Water-based primer and color paint finishes to be free of Hazardous Air Pollutants (HAPS) and Volatile Organic Compounds (VOCs). Paint to comply with ANSI A250.3 and A250.10.

#### PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify that project conditions are acceptable before beginning installation of frames.
  - 1. Verify that completed openings to receive knock-down wrap-around frames are of correct size and thickness.
  - 2. Verify that completed concrete or masonry openings to receive butt type frames are of correct size.
- B. Do not begin installation until conditions have been properly prepared.
- C. Correct unacceptable conditions before proceeding with installation.

## 3.2 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's printed installation instructions and with Steel Door Institute's recommended erection instructions for steel frames SDI A250.11 and NAAMM/HMMA 840.
- B. DHI Door and Hardware Institute Door Security + Safety Professionals Installation Guide for Doors and Hardware
- C. Fire Doors and Frames: Install in accordance with SDI A 250.11 and NFPA 80.
  - 1. To ensure compliance with Positive Pressure criteria as required by UBC7-2, UL10C, NFPA5000 and all applicable Local, State and National Code Jurisdictions, all Doors and Frames should be checked for accurate installation per Manufacturers installation instructions to provide proper fire and Smoke Gasketing as tested and listed.
  - 2. Fit hollow-metal doors accurately in frames, within clearances specified in SDI A 250.11 and SDI 100. Install fire rated doors with clearances specified in NFPA 80.
- D. Comply with provisions of SDI-105, "Recommended Erection Instructions for Steel Door Frames,"

unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.

- 1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.
- 2. In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors. Use additional anchors as required for height per manufacturers' installation instructions.
- 3. At existing concrete or masonry construction, install at least 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices. Use additional anchors as required for height per manufacturers' installation instructions.
- 4. In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws. Secure Sill Anchors to floor. Use additional anchors as required for height per manufacturers' installation instructions.
- 5. Drywall series frames are designed for installation in interior applications after construction of wood or metal stud and drywall applications. Drywall series frames are provided with adjustable jamb lock anchors for secure installation. Install frames per manufacturers' installation instructions. Adjust anchors and secure sill and baseboard anchors as provided.
- E. Remove temporary steel spreaders prior to installation of frames.
- F. Set frames accurately in position; plumb, align and brace until permanent anchors are set. After wall construction is complete, remove temporary wood spreaders.
  - 1. Field splice only at approved locations indicated on the shop drawings.
  - 2. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces.
- G. Provide full height 3/8 inch (9.5 mm) to 1-1/2 inch (38 mm) thick strip of polystyrene foam blocking at frames requiring grouting. Apply the strip to the back of the frame to facilitate field drilling or tapping.
- H. Glaze and seal exterior transom, sidelight and window frames in accordance with HMMA-820 TN03.
- I. Apply hardware in accordance with hardware manufacturers' instructions and Section 08 71 00 of these Specifications. Install hardware with only factory-provided fasteners. Install silencers. Adjust door installation to provide 1/8" at head and 1/8" at strike and hinge jamb with door undercut to meet fire ratings and floor conditions to achieve maximum operational effectiveness and appearance.

## 3.3 FIELD QUALITY CONTROL

- A. Fire-Rated Door Assembly Testing:
  - 1. Upon completion of the installation, test each fire door assembly to confirm proper operation of its closing device and verify that it meets all criteria of a fire door assembly per NFPA 80.
  - 2. Perform inspections by individuals with documented knowledge and understanding of the operation components of the type of door being tested per NFPA 80 and NFPA 101.
  - 3. Provide a written record to the Owner with copies available to the Authorities Having Jurisdiction (AHJ).

4. Record shall list the fire door assembly and include the door number with an itemized list of hardware set components for each door opening and location in the facility.

## 3.4 ADJUST AND CLEAN

- A. Adjust doors for proper operation, free from binding or other defects.
- B. Clean and restore soiled surfaces. Remove scraps and debris and leave site in a clean condition.
- C. Prime Coat Touch-Up: Immediately after erection, sand smooth rusted or damaged areas of prime coat, and apply touch-up of compatible air-drying primer.
- D. Properly clean and apply paint to doors and frames in accordance with HMMA-840 TN01 and ANSI A250.8 appendix B along with Manufactures recommended surface preparation for painting.

## 3.5 PROTECTION

A. Protect installed products and finished surfaces from damage during construction.

END OF SECTION

# SECTION 08 22 00 - FIBERGLASS REINFORCED POLYESTER (FRP) DOORS AND FRAMES

#### PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 DESCRIPTION

A. Scope of Work: Section includes fiberglass reinforced polyester (FRP) doors with aluminum frames.

## 1.3 RELATED SECTIONS

- A. Section 07 92 00 Joint Sealants.
- B. Section 08 71 00 Door Hardware.
- C. Section 08 80 00 Glazing.

## 1.4 REFERENCES

- A. International Building Code 2018 (IBC 2018)
- B. American Society for Testing and Materials (ASTM) Specifications.

1.	A 123	Zinc (Hot-Dip Galvanized) Coatings.
2.	C 591-01	Unfaced Preformed Rigid Cellular Polyisocyanurate.
3.	C 728-97	Insulation Board, Mineral Aggregate.
4.	E 84	Surface Burning Characteristics of Building Materials.
5.	E 330-97	Structural Load Test.
6.	E 1996	Wind Load Test.
7.	E 1886	Impact Test Procedures (inclusive of Large Missile Impact).

- C. Door and Frame Preparation for Hardware, American National Standard Institute Specifications (ANSI).
- D. Recommended Locations for Builder's Hardware, Door and Hardware Institute (DHI).
- E. Aluminum Association, Inc. (AA).
  - 1. AA5005-H14 Sheet Architectural.
  - 2. AA6061-T6 Heavy Duty Structures.

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- 3. AA6063-T5 Extrusions, Pipe, Architectural.
- 4. AA DAF-45 Designation System for Aluminum Finishes.
- F. American Architectural Manufacturers Association (AAMA).
  - 1. AAMA 2605-98 Superior Performing Organic Coatings (Kynar).
  - 2. AAMA 609 Anodized Architectural Finishes Cleaning and Maintenance.
  - 3. AAMA 611-98 Anodized Architectural Standards.

## 1.5 PERFORMANCE REQUIREMENTS

- A. Exterior FRP doors shall be designed to meet wind-loading requirements for the FBC. Refer to Structural Drawings for wind and design pressures.
  - 1. All exterior door assemblies shall be compliant with International Building Code 2018 for statewide product approval.
- B. Structural Test Unit: Minimum size of 3-feet (91.44 cm) by 7-feet (213.36 cm) with 24-inch (60.96 cm) by 34-inch (86.36 cm) vision light shall be evaluated compliant with ASTM E 330 testing method.
- C. Test Procedures and Performances:
  - 1. With door closed and locked, test unit in accordance with ASTM E 330 at static air pressure difference of 90.0 pounds per square foot (3.35 kPa) positive pressure and 90.0 pounds per square foot negative pressure.
  - 2. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanism, nor any other damage that would cause the door to be inoperable.
- D. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.
- E. Air Infiltration: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door shall not exceed 0.90 cfm per linear foot of perimeter crack.
- F. Water Resistance: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.
- G. Hurricane Test Standards, Single Door with Single-Point Latching:
  - 1. Uniform Static Load, ASTM E 330: Plus or minus 75 pounds per square foot.
  - 2. Forced Entry Test, 300 Pound Load Applied, SFBC 3603.2 (b)(5): Passed.
  - 3. Cyclic Load Test, SFBC PA 203: Plus or minus 53 pounds per square foot.
  - 4. Large Missile Impact Test, SFBC PA 201: Passed.
- H. Blast Test, Doors and Frames, ASTM F 1642-04, 6 psi / 41 psi-msec: Minimal Hazard.
- I. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.

- J. Cycle Slam Test Method, NWWDA T.M. 7-90: Minimum 5,000,000 Cycles.
- K. Swinging Security Door Assembly, Doors and Frames, ASTM F 476: Grade 40.
- L. Salt Spray, Exterior Doors and Frames, ASTM B 117: Minimum of 500 hours.
- M. Sound Transmission, Exterior Doors, STC, ASTM E 90: Minimum of 25.
- N. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Minimum of 55 CRF value.
- O. Surface Burning Characteristics, FRP Doors and Panels, ASTM E 84:
  - 1. Flame Spread: Maximum of 200, Class C.
  - 2. Smoke Developed: Maximum of 450, Class C.
- P. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
  - 1. Flame Spread: Maximum of 25.
  - 2. Smoke Developed: Maximum of 450.
- Q. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 15.0 foot-pounds per inch of notch.
- R. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 14,000 psi.
- S. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.
- T. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.
- U. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.
- V. Gardner Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 5420: 120 in-lb.
- W. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.
- X. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.
- Y. Chemical Resistance, ASTM D 543. Excellent rating.
  - 1. Acetic acid, Concentrated.
  - 2. Ammonium Hydroxide, Concentrated.
  - 3. Citric Acid, 10%.
  - 4. Formaldehyde.
  - 5. Hydrochloric Acid, 10%
  - 6. Sodium hypochlorite, 4 to 6 percent solution.

- Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 79.9 psi. Z.
- AA. Compressive Modulus, Foam Core, Nominal Value, ASTM D 1621: 370 psi.
- BB. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 45.3 psi.
- CC. Thermal and Humid Aging, Foam Core, Nominal Value, 158 Degrees F and 100 Percent Humidity for 14 Days, ASTM D 2126: Minus 5.14 percent volume change.

#### PROJECT CONDITIONS 1.6

Field Measurements: Take field measurements of areas to receive aluminum frames. Show A. recorded measurements and note discrepancies on submitted shop drawings.

#### 1.7 **SUBMITTALS**

- A. Submit in accordance with Division 1. Include copies of manufacturer's specifications for fabrication and installation including certifications, data and test reports substantiating that products comply with requirements.
- Product Data: Manufacturer's descriptive literature for each type door and frame: include the B. following information:
  - 1. Fabrication methods.
  - Finishing. 2.
  - Hardware preparation. 3.
  - Accessories. 4.
- C. Submit shop drawings showing sizes and complete details of doors. Include details of core and edge construction, trim for openings and similar components. Include finishing specifications for doors to receive factory-applied shop finish. Indicate the following:
  - 1. Elevations and details of each door and frame type.
  - 2. Provide a schedule of doors and frames using same reference designations for details and openings as indicated on the Contract Drawings.
  - Conditions at openings with various wall thicknesses and materials. 3.
  - Location and installation requirements for hardware. 4.
  - Thicknesses of materials, joints. 5.
  - Connections and trim. 6.

#### D. Samples:

Color: Three sets of color chips representing manufacturer's samples of standard colors 1. and finishes of doors and frames.

#### E. **Verification Samples:**

- 1. Submit samples of each type, consisting of aluminum door corner construction, minimum 6-inch by 6-inch (150 mm) legs.
- Where color or texture variations are anticipated, such as anodized finishes, include two 2. or more units in each set of samples indicating extreme limits of variations.

- F. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
- G. Warranty: Submit manufacturer's standard warranty.
- H. Furnish to the Owner six (6) copies of an Owners Operation and Maintenance Manual in accordance with Division 1. The manual shall consist of manufacturer's maintenance and cleaning instructions for doors and frames, including maintenance and operating instructions for hardware. Provide catalog pages for each product; name, address and phone number of the local representative of each manufacturer; and copy of the approved shop drawings.

## 1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing aluminum door and frame systems of the type required for this project, with minimum ten continuous years documented experience.
  - 1. Door and frame components from same manufacturer.
- B. Product Qualifications: Wind-load test certification conforming to ASTM E 330 on samples of previous products shall be provided for the type of door to be used.
- C. Installer's Qualifications: Workmen skilled in handling aluminum door and frame systems of the type required for this project.
- D. Instruction: The manufacturer or his representative will be available for consultation to all parties engaged in the project, including instruction to installation personnel.

## 1.9 PRODUCT HANDLING

- A. Deliver doors and frames palleted, wrapped or individually crated. Doors shall be side protected with surrounding grooved 2-inch by 4-inch wood frame and covered with 275-pound test corrugated cardboard.
- B. Inspect delivered doors and frames for damage; unload and store with minimum handling. Repair minor damage if refinished items are equal in all respects to new work; otherwise, remove damaged items and replace with new.
- C. Doors are to be stacked flat in a dry and protected area in original cartons prior to installation. Provide blocking or staging to protect door surfaces. <u>Do not drag doors across one another.</u> Lift doors and carry them into position. Identify each door with individual opening designations, as indicated on the approved shop drawings, using concealed markings.
- D. Handling: Protect materials and finish from damage during handling and installation.

#### 1.10 WARRANTY

A. Submit written agreement in door manufacturer's standard form signed by manufacturer, Installer and Contractor, agreeing to repair or replace defective doors which have separated, delaminated from the core, expansion of the core, or otherwise failed due to defects in material

and workmanship, improper installation or corrosion from a specified environment, for a period of not less than five (5) years.

## PART 2 - PRODUCTS

## 2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
  - 1. **Basis of Design:** Cline Doors, Inc., Bradenton, Florida
  - 2. Marshall/Vega Corporation, Marshall, Arkansas.
  - 3. Special-Lite, Inc., Decatur, Michigan Basis of Design Product.
  - 4. Tiger Door, LLC.

#### 2.2 COMPONENTS

A. Provide all door and frame components from the same manufacturer.

## 2.3 FIBERGLASS REINFORCED POLYESTER (FRP) FLUSH DOORS

- A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish.
- B. Door Opening Size: As indicated on the Drawings.
- C. FRP Door Composite Components: Minimum 3-ply composite laminated construction to include:
  - 1. Facing: 0.120-inch (3.05 mm) composite FRP panel exterior grade, UV-protected fiber reinforced polyester panel on interior and exterior faces. Ultraviolet inhibitors shall be maximum amount formulated within the resin. Exterior and interior FRP panels shall be a Class C Flame Spread: Maximum of 75, and Smoke Developed Rating of 450 or less (ASTM E 84)
  - 2. Surface texture will be pebble embossed with a non-directional pattern.
  - 3. Color: Provide manufacture's full range of standard colors. Consult Architect for final color selection.
  - 4. All mylar transporter fabrication film must be removed from FRP face sheets prior to door fabrication.
  - 5. FRP face panels shall be USDA accepted with minimal porosity.
  - 6. Face sheet shall be bonded to core and backup tube from edge to edge of door.
  - 7. FRP face sheets shall be a Class C Flame Spread: Maximum of 75 and Smoke Developed rating of 450 or less (ASTM E 84), for both interior and exterior faces of interior and exterior doors.
  - 8. Core: Organic materials shall be used to form a marine grade honeycomb core with high compression strength of 94.8 psi (ASTM C365), and internal aluminum hardware backup tube.
  - 9. Cutouts: Manufacture doors with cutouts for required vision lites. Factory install vision lites.

- 10. Hardware Backup: The hardware backup tube shall be a minimum 4.25-inches (107.95 mm) in width, 1.375-inches (34.93 mm) in depth with a wall thickness of 0.125-inches (3.18 mm). Contiguous for the full perimeter of the door to allow for all specified and non-specified hardware reinforcement.
- 11. Hardware Prep: Basic to include mortise lock edge prep or cylindrical lock prep; and pairs prepped for 3-point latch, if required.
- 12. Bonding Agent: Environmentally friendly adhesive with strength buildup of 350 pounds per square inch (24.6 kg/cm<sup>2</sup>).
- 13. Perimeter Door Trim: Wall thickness of 0.050-inch (1.25 mm) minimum in 6063-T5 extruded aluminum alloy with special beveled edge cap design and integral weather stripping on lock stile.
- 14. Replaceable Door Trim: Mechanically fastened to the hardware backup tube, allowing for replacement in the field, if damaged.
- 15. Trim Finish: To have minimum of a Class I anodized finish.
- 16. Weather stripping: Replaceable wool pile with nylon fabric, polypropylene backing meeting AAMA 701standards. Applied weather stripping not acceptable
- 17. Materials: Only nonferrous, non-rusting members shall be acceptable, including tie rods, screws and reinforcement plates.
- 18. Regulations: All components and agents to meet EPA standards.

## 2.4 HARDWARE

- A. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
- B. Factory install hardware.
- C. Hardware Schedule: As indicated on Hardware Schedule. The following items to be supplied and installed by FRP Door Manufacturer including any additional requirements to meet Hurricane Rating.
  - 1. Concealed adjustable bottom brush: Install door manufacturer's multidirectional adjustable bottom with double nylon brush weatherstripping. Door bottom must be concealed and adjust to accommodate irregular tapered floor conditions.
  - 2. ADA Flush Door Pull.
  - 3. Continuous Geared Hinge
- D. Hardware Finish: Clear Anodized Aluminum.

## 2.5 GLAZING

- A. Glass shall be 0.5625-inch (14.29 mm) laminated hurricane glass
- B. Stops shall be snap-in, non-removable type, 6063-T5 extruded aluminum alloy and 0.050-inch (1.25 mm) thickness.
- C. Seals shall be vinyl inserts.
- D. No fasteners shall be exposed.

## 2.6 ALUMINUM FRAMES:

- A. Frame Components: Extruded channel (tubular) 6063-T5 aluminum alloy, minimum wall thickness 0.125-inch (3.18 mm); cut corners square and joinery shall be mechanical with no exposed fasteners.
- B. Profile: Closed Back: Provide manufacturer's Closed Back Insert with Applied Stop (CBS), 1<sup>3</sup>/<sub>4</sub> inches by 5 inches (44 x 127 mm).
- C. Hinge and Strike Mounting Plates: Extruded aluminum alloy bar stock, 0.1875-inch (4.75 mm) thick mounted in a concealed integral channel with no exposed fasteners.
- D. Replaceable Weather stripping: AAMA 701, wool pile with nylon fabric, polypropylene backing, at head and jambs.
- E. Door Stop: No screw-on stops acceptable.
- F. Frame Finish: Shall be anodized with Class II mechanical finish to match door finish.
- G. Door Gasket: per door Manufacturer with Hurricane requirements
- H. Hardware:
  - 1. Premachine and reinforce frame members for hardware in accordance with manufacturer's standards and hardware schedule.
  - 2. Factory install hardware.
- I. Anchors: Hurricane Rated Anchors
  - 1. Anchors appropriate for wall conditions to anchor framing to wall materials.
  - 2. Door Jamb and Header Mounting Holes: Maximum of 24-inch centers.

#### 2.7 FABRICATION

- A. General: Receive hardware if required by manufacturer.
- B. FRP Door Construction: Of type, size and design indicated:
  - 1. Minimum Thickness: 1.75-inches (44 mm), 3-ply composite laminate system.
  - 2. Door Size: Sizes shown are nominal; provide standard clearances as follows:
    - a. Hinge and Lock Stiles: 0.125-inch (3.18 mm).
    - b. Between Meeting Stiles: 0.25-inch (6.35 mm).
    - c. At Top Rails: 0.125-inch (3.18 mm).
    - d. Between Door Bottom and Threshold: 0.125-inch (3.18 mm).
- C. Aluminum Frames: Of shapes and contours indicted.
  - 1. Corners shall be cut square.
  - 2. Reinforce and secure mechanically.
  - 3. No exposed fasteners.

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## D. Assembly:

- 1. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
- 2. Remove burrs from cut edges.

#### E. Fit:

- 1. Maintain continuity of line and accurate relation of planes and angles.
- 2. Secure attachments and support at mechanical joints with hairline fit at contacting members.

## 2.8 FINISH

- A. FA. Finish: High Performance Organic Coating: Kynar/Polyvinylidene Fluoride (PVDF) (AAMA 605.2).
  - 1. Color: Selected by Architect from manufacturer's full range of available colors.

## 2.9 ACCESSORIES:

- A. Fasteners: Aluminum, nonmagnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.
  - 1. Do not use exposed fasteners.
- B. Brackets and Reinforcements: Manufacturer's high strength aluminum units where feasible, otherwise nonferrous stainless steel.
- C. Bituminous Coating: Cold applied asphaltic mastic, compounded for 30 mil thickness per coat.

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

A. Verify upon delivery that all doors and frames comply with the approved shop drawings and meet the indicated requirements for type, size, location and swing. Examine each opening for conditions that would prevent the proper application of doors, frames and related items or subsequent use. Do not proceed until defects are corrected.

## 3.2 INSTALLATION

- A. Preparation: Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions; do not damage sight-exposed finishes.
- B. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings; set frames plumb, square, level, within manufacturer's tolerances and aligned to receive doors.
- C. Install exterior doors to be weathertight in closed position.

- D. Anchor frames to adjacent construction in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer's instructions.
  - 1. Seal metal-to-metal joints between framing members using good quality elastomeric sealant.
- E. Where aluminum surfaces contact with metals other than stainless steel, zinc or small areas of white bronze, protect from direct contact by one or more of the following methods.
  - Paint dissimilar metal with one coat of heavy-bodied bituminous paint. 1.
  - 2. Apply good quality elastomeric sealant between aluminum and dissimilar metal.
  - 3. Paint dissimilar metal with one coat of primer and one coat of paint recommended for aluminum surface applications.
  - 4. Use non-absorptive tape or gasket in permanently dry locations.
- F. Hang doors with required clearances as follows:
  - 1. Hinge and Lock Stiles: 0.125 inch (3.18 mm).
  - Between Meeting Stiles: 0.250 inch (6.35 m). 2.
  - At Top Rails: 0.125 inch (3.18 mm). 3.
  - Between Door Bottom and Threshold: 0.125 inch (3.18 mm). 4.
- G. Set thresholds in bed of mastic and backseal.
- H. Install hardware for doors of this section.

#### 3.3 FIELD QUALITY CONTROL

Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance A. and guidance for installation of doors.

#### 3.4 **ADJUSTING**

Adjust doors, hinges, and locksets for smooth operation without binding. A.

#### 3.5 **CLEANING**

- Upon completion of installation thoroughly clean door and frame surface in accordance with A. AAMA 609 and manufacturer's instructions.
- Do not use harsh, abrasive, caustic or acid cleaning agents or methods that would damage B. finish.

#### 3.6 **PROTECTION**

- Protect products of this section from damage caused by subsequent construction until A. substantial completion.
- Repair damage or defect products to original specified condition in accordance with B. manufacturer's recommendations.

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C. Replace damaged or defective products that cannot be repaired to the Architect's acceptance.

END OF SECTION 08 22 00

#### SECTION 08 33 13 - COILING COUNTER DOORS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Counter door assemblies.
- B. Related Requirements:
  - 1. Section 05 50 00 "Metal Fabrications" for door-opening framing.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type and size of coiling counter door and accessory.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
  - 1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
  - 2. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
  - 3. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified.

## 1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

## 1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

## PART 2 - PRODUCTS

## 2.1 COUNTER DOOR ASSEMBLY

A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
  - a. ACME Rolling Doors.
  - b. Alpine Overhead Doors, Inc.
  - c. Lawrence Roll-Up Doors, Inc.
  - d. McKeon Rolling Steel Door Company, Inc.
  - e. Metro Door LLC.
- B. Operation Cycles: Door components and operators capable of operating for not less than 10,000.
- C. STC Rating: 26.
- D. Door Curtain Material: Stainless steel.
- E. Door Curtain Slats: Flat profile slats of 1-1/2-inch center-to-center height.
  - 1. Fenestrated Slats: Approximately 4- by 5/8-inch openings spaced approximately 1-1/2 inches apart and beginning 12 inches from jamb guides.
- F. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, fabricated stainless steel and finished to match door.
- G. Curtain Jamb Guides: Stainless steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
- H. Hood: Stainless steel.
  - 1. Mounting: As indicated on Drawings.
- I. Integral Frame, Hood, and Fascia: Stainless steel.
  - 1. Mounting: As indicated on Drawings.
- J. Sill Configuration: Integral metal sill.
- K. Locking Devices: Equip door with locking device assembly.
  - 1. Locking Device Assembly: Single-jamb side locking bars, operable from outside with cylinder.
- L. Manual Door Operator: Manufacturer's standard crank operator.
- M. Curtain Accessories: Equip door with push/pull handles.
- N. Door Finish:
  - 1. Factory Prime Finish: Manufacturer's standard color.

## 2.2 DOOR CURTAIN MATERIALS AND FABRICATION

- A. Door Curtains: Fabricate coiling counter door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.
  - 1. Removable Posts and Jamb Guides: Manufacturer's standard.

## 2.3 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
  - 1. Include automatic drop baffle on fire-rated doors to guard against passage of smoke or flame.
- B. Integral Frame, Hood, and Fascia: Welded sheet metal assembly of the following sheet metal(s):

## 2.4 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
  - 1. Lock Cylinders: As specified in Section 08 71 00 "Door Hardware".
  - 2. Keys: Two for each cylinder.

## 2.5 CURTAIN ACCESSORIES

A. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

## 2.6 COUNTER DOOR ACCESSORIES

A. Integral Metal Sill: Fabricate sills as integral part of frame assembly of Type 304 stainless steel in manufacturer's standard thickness with ASTM A480/A480M No. 4 finish.

#### 2.7 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

## 2.8 MANUAL DOOR OPERATORS

- A. General: Equip door with manual door operator by door manufacturer.
- B. Crank Operator: Consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit, of type indicated. Size gears to require not more than 25-lbf force to turn crank. Fabricate gearbox to be oil tight and to completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.

#### PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

## 3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and to furnish reports to Architect.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

#### 3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 08 33 13

#### SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

#### A. Section Includes:

- 1. Aluminum-framed storefront systems.
- 2. Aluminum-framed entrance door systems.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
  - 1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
  - 2. Include point-to-point wiring diagrams.
- C. Samples: For each type of exposed finish required.
- D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.
- E. Delegated Design Submittal: For aluminum-framed entrances and storefronts, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.
- B. Product test reports.
- C. Source quality-control reports.
- D. Field quality-control reports.
- E. Sample warranties.

## 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer and that employs a qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors and that employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program.
- B. Testing Agency Qualifications: Qualified in accordance with ASTM E699 for testing indicated and acceptable to Owner and Architect.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

## 1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of bakedenamel, powder-coat, or organic finishes within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.
- C. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

#### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design aluminum-framed entrances and storefronts.

- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.

#### C. Structural Loads:

- 1. Wind Loads: As indicated on Drawings.
- 2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members Supporting Glass: At design wind load, as follows:
  - 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches.
  - 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
    - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
  - 3. Cantilever Deflection: Limited to 2L/175 at unsupported cantilevers.
- E. Structural: Test in accordance with ASTM E330/E330M as follows:
  - 1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
  - 2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:
  - 1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

- G. Energy Performance: Certified and labeled by manufacturer for energy performance as follows:
  - 1. Thermal Transmittance (U-factor):
    - a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.45 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.
    - b. Entrance Doors: U-factor of not more than 0.68 Btu/sq. ft. x h x deg F as determined in accordance with NFRC 100.
  - 2. Solar Heat-Gain Coefficient (SHGC):
    - a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.35 as determined in accordance with NFRC 200.
    - b. Entrance Doors: SHGC of not more than 0.35 as determined in accordance with NFRC 200.
  - 3. Air Leakage:
    - a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft. when tested in accordance with ASTM E283.
    - b. Entrance Doors: Air leakage of not more than 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
  - 4. Condensation Resistance Factor (CRF):
    - a. Fixed Glazing and Framing Areas: CRF for the system of not less than 35 as determined in accordance with AAMA 1503.
    - b. Entrance Doors: CRF of not less than 57 as determined in accordance with AAMA 1503.
- H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

#### 2.2 STOREFRONT SYSTEMS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
  - 1. Kawneer North America, an Arconic company.
  - 2. Trulite Glass & Aluminum Solutions, LLC.
  - 3. Tubelite Inc.
  - 4. <u>U.S. Aluminum; a brand of C.R. Laurence</u>.
  - 5. YKK AP America Inc.
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Exterior Framing Construction: Thermally broken.

- 2. Interior Vestibule Framing Construction: Nonthermal.
- 3. Glazing System: Retained mechanically with gaskets on four sides.
- 4. Finish: High-performance organic finish.
- 5. Fabrication Method: Field-fabricated stick system.
- 6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
- 7. Steel Reinforcement: As required by manufacturer.
- C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

#### 2.3 ENTRANCE DOOR SYSTEMS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
  - 1. <u>Kawneer North America, an Arconic company</u>.
  - 2. Trulite Glass & Aluminum Solutions, LLC.
  - 3. Tubelite Inc.
  - 4. U.S. Aluminum; a brand of C.R. Laurence.
  - 5. YKK AP America Inc.
- B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.
  - 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
    - a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
  - 2. Door Design: Wide stile; 5-inch nominal width.
  - 3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
    - a. Provide nonremovable glazing stops on outside of door.

## 2.4 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 08 71 00 "Door Hardware."
- B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door, to comply with requirements in this Section.

- 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
- 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- 3. Opening-Force Requirements:
  - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
  - b. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- C. Designations: Requirements for design, grade, function, finish, quantity, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
  - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements.

    Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
  - 2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- D. Pivot Hinges: BHMA A156.4, Grade 1.
  - 1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf
- E. Butt Hinges: BHMA A156.1, Grade 1, radius corner.
  - 1. Nonremovable Pins: Provide setscrew in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
  - 2. Exterior Hinges: Stainless steel, with stainless steel pin.
  - 3. Quantities:
    - a. For doors up to 87 inches high, provide three hinges per leaf.
    - b. For doors more than 87 and up to 120 inches high, provide four hinges per leaf.
- F. Continuous-Gear Hinges: BHMA A156.26.
- G. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
- H. Manual Flush Bolts: BHMA A156.16, Grade 1.
- I. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.
- J. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing in accordance with UL 305.
- K. Cylinders:

- 1. As specified in Section 08 71 00 "Door Hardware."
- 2. BHMA A156.5, Grade 1.
  - a. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE" to be furnished by Owner.
- L. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
- M. Operating Trim: BHMA A156.6.
- N. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.
- O. Concealed Overhead Holders and Stops: BHMA A156.8, Grade 1.
- P. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
- Q. Weather Stripping: Manufacturer's standard replaceable components.
  - 1. Compression Type: Made of ASTM D2000 molded neoprene or ASTM D2287 molded PVC.
  - 2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- R. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- S. Thresholds: BHMA A156.21 raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.
- T. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

## 2.5 GLAZING

- A. Glazing: Comply with Section 08 80 00 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.

## 2.6 MATERIALS

A. Sheet and Plate: ASTM B209.

- B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
- C. Structural Profiles: ASTM B308/B308M.
- D. Steel Reinforcement:
  - 1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
  - 2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
  - 3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
- E. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

#### 2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
  - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

## 2.8 ALUMINUM FINISHES

- A. High-Performance Organic Finish, Two-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
  - 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.
  - 2. Color and Gloss: As selected by Architect from manufacturer's full range.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions.
- B. Do not install damaged components.
- C. Fit joints to produce hairline joints free of burrs and distortion.
- D. Rigidly secure nonmovement joints.
- E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- F. Seal perimeter and other joints watertight unless otherwise indicated.

#### G. Metal Protection:

- 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
- 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- H. Set continuous sill members and flashing in full sealant bed, as specified in Section 07 92 00 "Joint Sealants," to produce weathertight installation.
- I. Install joint filler behind sealant as recommended by sealant manufacturer.
- J. Install components plumb and true in alignment with established lines and grades.

## 3.2 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 08 80 00 "Glazing."

#### 3.3 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOORS

A. Install entrance doors to produce smooth operation and tight fit at contact points.

- 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
- 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware in accordance with entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

## 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.
  - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.
    - a. Perform a minimum of two tests in areas as directed by Architect.
  - 2. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
    - a. Perform a minimum of two tests in areas as directed by Architect.
  - 3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.
- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 08 41 13

## FEMA HMGP PHASE II SAFE ROOM CONTRACT #: BCSD-SAFE ROOM 03

#### SECTION 08 71 00 - DOOR HARDWARE

#### PART 1 GENERAL

#### 1.1 SUMMARY

## A. Section Includes:

1. Hardware for swinging Aluminum, Hollow Metal and Wood Door Openings.

#### B. Related Sections:

- 1. Section 01 25 13 Product Substitution Procedures
- 2. Section 08 11 13 Hollow Metal Doors and Frames
- 3. Section 08 41 13 Aluminum Framed Entrances and Storefronts
- 4. Section 26 05 19 Low Voltage Electrical Power Conductors and Cables

#### 1.2 REFERENCES

- A. Use the following references to properly detail, schedule, furnish and install finish hardware items.
  - 1. NFPA 80 Standard for Fire Doors and Other Opening Protectives (2007)
  - 2. DHI Installation Guide for Doors and Hardware (1984)
  - 3. DHI Sequence and Format for the Hardware Schedule (1996)
  - 4. ANSI/BHMA A156.4 Door Controls Closers (2013)
  - 5. ANSI/BHMA A156.13 Mortise Locks and Latches Series 1000 (2012)
  - 6. ANSI/BHMA A156.18 Materials and Finishes (2012)

#### 1.3 SUBMITTALS

#### A. Schedule:

- 1. Provide submittals in accordance with 01 33 00 Submittal Procedures.
- 2. Provide hardware schedule in vertical format on 8-1/2-inch by 11-inch paper or electronic format. Conform to DHI publication Sequence and Format for Hardware Schedule using Architect's door numbers and hardware set numbers.
- 3. Provide elevation drawings for openings with electrical hardware and access control devices with each hardware schedule. Include illustration of opening, operational description, electrified hardware components, legend, approximate mounting location and size of enclosures, size and quantity of conductors, facility name and date.
- B. Product Data: Provide one set of manufacturer's catalog and technical data for each hardware item used, highlighting design, function, fasteners, accessories, and options to facilitate review with each hardware schedule submitted.
- C. Templates: Provide two sets of manufacturer's templating information for mortised and template hardware upon receipt of approved hardware schedule to the door and frame supplier(s). Include requirements for internal reinforcements required for surface mounted hardware.

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## D. Wiring Diagrams:

- 1. Three sets point-to-point diagrams specially developed for each opening that requires electrical hardware, with hardware delivery to jobsite. Reference elevation drawings submitted with hardware schedule using Architect's opening numbers.
- 2. Three sets riser diagrams for openings requiring power supplies or access control. Include placement of power supplies, distance of wire runs from power supply, cable quantity and number and gauges of wires.
- E. Keying Schedule: Arrange meeting with Owner, Architect and finish hardware supplier to determine keying requirements immediately upon receipt of finish hardware schedule.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Furnish operations and maintenance manual is accordance with Section 01 78 28 Operations and Maintenance Data and as follows:
  - 1. Furnish one copy of manual at date of Substantial Completion in a 2-1/2-inch thick binder labeled with project information, date and name and contact information for the hardware supplier.
  - 2. Include in manual:
    - a. Copy of approved hardware schedule, including door numbers and locations. Highlight fire rated door to aid in annual fire door inspection.
    - b. Copy of approved keying schedule.
    - c. Catalog data for each product.
    - d. As-installed "wiring diagrams" for each opening connected to power.
    - e. Parts list for locksets, exit devices, and door closers.
    - f. Installation templates and instructions.
    - g. Warranty information.
    - h. Name, address, and phone number of local representatives for each manufacturer.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

#### A. Extra Materials:

- 1. Screws and Fasteners: Fifty of each screw and fastener required for general maintenance of hinges, locks, closers, exit devices, and sealing systems.
- 2. Deliver to Owner remaining finish hardware fasteners and special installation tools upon completion of Project.

## 1.6 QUALITY ASSURANCE

#### A. Supplier:

- 1. Furnish hardware from recognized supplier who has warehousing facility within 100 miles of project location, and who has actively supplied hardware for similar projects in the vicinity for a minimum of five years.
- 2. Supplier shall employ an Architectural Hardware Consultant (AHC), as certified by Door and Hardware Institute, on staff full time to administer and supervise project.

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B. Installer: Install hardware using installers who have actively installed commercial door hardware for a minimum of five years, and are familiar with hardware installation of type required on this Project.

## C. Pre-Installation Meeting:

- 1. Prior to installation of hardware, arrange for manufacturer's representatives of locksets, door closers, and exit devices to hold a jobsite meeting to instruct the installing personnel on the proper installation of their products.
- 2. Send a letter of compliance, indicating when this meeting was held, and who was in attendance, to the Architect and Owner.

## D. Fire Rated Door Openings:

- 1. Comply with NFPA 80.
- 2. Furnish nationally recognized testing agency label or stamp on hardware for labeled openings.
- 3. Only labeled locks or latches or fire exit hardware can be used on fire rated openings.
- 4. Where UL requirements conflict with Drawings or Specifications, furnish hardware conforming to the UL requirements.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

## A. Delivery:

- 1. Jointly check in hardware, upon delivery to jobsite, against approved hardware schedule with hardware supplier. Record shortage or damage and replace or repair as necessary.
- 2. Deliver hardware to be installed during fabrication of doors and frames, to manufacturer.

#### B. Storage:

- 1. Store hardware in a secure, dry, temperature-controlled room on shelving to protect against loss, theft, and damage.
- 2. Store items too long for shelving on pallet, off the floor.

## C. Marking and Packaging:

- 1. Deliver hardware to jobsite in manufacturer's original packaging marked to correspond with approved hardware schedule with Architect's door numbers and hardware sets.
- 2. Mark all locksets, exit devices, cylinders, auxiliary hardware and key switches with keyset symbol.
- 3. Replace any wet or damaged packaging with new.

#### 1.8 WARRANTY

- A. Furnish warranties in accordance with Section 01 78 36 Warranties. Extended or limited warranties shall be as follows:
  - 1. Cylindrical Locksets: Seven (7) Years.
  - 2. Door Closers: Thirty (30) Years.
  - 3. Exit Devices: Five (5) Years.

#### **PART 2 PRODUCTS**

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#### 2.1 MANUFACTURERS

A. The following manufacturers were used in the hardware sets.

1.	Butt Hinges	Stanley	STN
2.	Continuous Hinges	Stanley	STN
3.	Locks and Latchsets	Best	BST
4.	Cylinders and Cores	Best	BST
5.	Surface Closers	Dorma	BST
6.	Exit Devices	Precision	DOR
7.	Overhead Stop/Holders	Dorma	DOR
8.	Door Pulls	Trimco	TRM
9.	Flushbolts	Trimco	TRM
10.	Protection Plates	Trimco	TRM
11.	Wall/Floor Stops	Trimco	TRM
12.	Thresholds and Gasketing	National Guard	NGP
13.	Silencers	Trimco	TRM

- B. Submit requests for substitution in accordance with Section 01 25 13 Product Substitution requirements and as follows:
  - 1. Provide catalog data with product information highlighted or bubbled to facilitate review in addition to physical samples in the specified finish and function. Product must meet or exceed level or design intended and/or function established by specified products.

## 2.2 MATERIALS

#### A. Screws and Fasteners:

- 1. Provide manufacturer's recommended fasteners of proper type, material and finish.
- 2. Provide self-tapping screws for sweeps and stop applied weatherstripping.
- 3. Utilize through-bolts for the attachment of door closers and exit devices on non-reinforced doors only. Finish: match door face.
- 4. Exposed screw heads: phillips type.

## C. Hinges:

#### 1. Type:

- a. Five-knuckle, full mortise, ball bearing.
- b. Furnish heavy weight hinges on heavy doors and doors expected to have high frequency use.

## 2. Quantity:

- a. One pair of hinges for all doors up to 5 feet high. Furnish one additional hinge for every 2'-6" in height or fraction thereof.
- b. Four hinges at dutch doors up to 7'-6" in height.

#### 3. Size:

- a. For 1-3/4-inch thick doors up to 3 feet wide: 4 ½-inches high
- b. For 1-3/4-inch thick doors over 3 feet wide: 5-inches high
- c. For all doors over 1-3/4-inches thick: 5-inches high

d. Size in width shall minimally clear door trim.

## 4. Application:

- a. NRP (non-removable pin) at exterior doors and reverse bevel doors with locking hardware.
- b. Electric hinges: have a sufficient number of concealed wires to accommodate electrical function of hardware. Furnish junction box and mortar shield.

## 5. Acceptable manufacturers and types:

Type	Stanley	McKinney	Hager
Standard Weight	FBB179	TB2714	BB1179
Heavy Weight	FBB168	T4B3786	BB1168

## D. Continuous Hinges:

- 1. Configuration appropriate for type, inset, and thickness of door. Coordinate with door manufacturer.
- 2. Meet UL fire label listing requirements at UL rated openings. Include fire pins as required by manufacturer.
- 3. Acceptable manufacturers and types:

Door Type	Stanley	ABH	Select
Aluminum	661HD	A110HD	SL11HD
Hollow	662HD	A240HD	SL24HD
Metal			

## E. Door Bolts:

#### 1. Flushbolts:

- a. Manual Flushbolts: Two for inactive leaf of locked pairs of doors at non-occupied rooms.
- b. Self-Latching Flushbolts: One pair for inactive leaf at pairs of doors where inactive leaf is not required for egress.
- c. Automatic Flushbolts: One pair at fire rated doors, and occupied rooms required for egress.
- d. Acceptable manufacturers and types:

Bolt/Door Type	Trimco	Burns	ABH
Manual Metal	3917	590	1855
Manual Wood	3913	591	1857
Automatic Metal	3810	7842	1860
Automatic Wood	3815	7942	1862
Self-Latching Metal	3820 x 3810	7845	1863
Self-Latching	3825 x 3815	7945	1864
Wood			

#### F. Locksets:

## 1. Cylindrical Locksets:

- a. Conform to ANSI/BHMA A156.2, Series 4000 Operational Grade 1.
- b. Latchbolt with appropriate throw for fire rated doors and pairs of doors in accordance with manufacturers listing.

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- c. Lock functions as specified in hardware schedule.
- d. Electrical functions as specified in hardware schedule, 24VDC.
- e. Lever design: 14D
- f. Backset: 2-3/4-inch
- g. Strike single door: ANSI 4-7/8-inch with proper lip length to minimally clear trim.
- h. Strike pair of doors: flat lip strike sized to fit flush with face of door.
- i. Furnish wrought strike box.
- j. Lever trim shall function in a bi-directional motion.
- k. Acceptable manufacturers and types:

Best	Schlage	Sargent
9K	ND	10
Series	Series	Series

## 2. Cylinders:

- a. Provide mortise and rim cylinders and cores from same manufacturer as locksets, for all locksets, exit devices, cylinder dogging, key switches and auxiliary hardware.
- b. Appropriate cam and blocking rings for proper installation

## G. Keys & Keying

- 1. Cylinders: 7-pin, interchangeable core and keyed into an Existing BEST Cormax factory registered Masterkey System. No Substitutions.
- 2. Provide construction cores and keys during construction period. Construction control and operating keys and cores are not part of permanent keying system or furnished on same keyway (or key section) as permanent keying system.
- 3. Permanent Keys and Cores: Prepare permanent cores and keys in accordance with keying schedule. Provide Masterkeys and other Security Keys.
- 4. Furnish keys in the following quantities:
  - a. 4 each Masterkeys per new Masterkey set.
  - b. 2 each Change keys each keyed core.
  - c. 6 each Construction Masterkeys.
  - d. 2 each Construction Control keys.
  - e. 2 each Control keys.
- 5. Install permanent cores in locksets.
- 6. Return construction cores to Hardware Supplier.

#### H. Exit Devices:

- 1. UL-listed for fire at fire door assemblies, and UL listed for panic at non-rated door assemblies.
- 2. Size exit devices to proper door width and height.
- 3. Stainless Steel deadlocking <sup>3</sup>/<sub>4</sub> -inch throw latch bolt.
- 4. LBR (less bottom rod) where scheduled to eliminate use of floor mounted strikes.
- 5. Cylinders for exit devices with cylinder dogging or locking trim.
- 6. Exit device channel assembly must be a one-piece assembly with no visible screw heads on the back of the channel assembly.
- 7. Exit device touch bar should not create grab points when in the dogged down position.
- 8. Exit device trim must have a four-point mounting foot for installation.
- 9. Exit device touch bar will eliminate pinch point between touch bar and channel assembly when depressed.

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- 10. All exposed metals shall be manufactured in the same finish as the specified finish for the project.
- 11. No exposed plastic parts will be accepted.
- 12. All latchbolts shall be deadlocking for all applications.
- 13. Electrical functions as scheduled in sets. Provide power supply and power transfer from same manufacturer as electrified exit device.
- 14. Strike: as recommended by manufacturer.
- 15. Lever design: To match lockset trim.
- 16. Acceptable manufacturers and types:

Precision	Sargent	Von Duprin	Detex
Apex 2000	80	98	10
Series	Series	Series	Series

#### I. Surface Door Closers:

- 1. Conform to ANSI/BHMA A156.4 Grade 1.
- 2. Heavy duty high silicon aluminum alloy or cast iron body closers.
- 3. Furnish manufacturers recommended size, arms and configuration for door and frame application required.
- 4. Closer arms shall accommodate project applications as specified.
- 5. Furnish brackets, spacers, support shoes, and plates for complete and proper installation.
- 6. Acceptable manufacturers and types:

Dorma	LCN	Norton
8900	4040	7500
Series	Series	Series

## J. Overhead Door Stop:

- 1. Provide overhead stop or overhead stop/holder for interior doors as specified. Provide overhead stop for interior doors and at any door that swings more than 140 degrees before striking a wall, open against equipment, casework, sidelights, and/or where conditions do not allow a wall stop or a floor stop presents a tripping hazard.
- 2. Where overhead holders are specified provide friction type at doors without a closer and positive type at doors with a closer.
- 3. Acceptable manufacturers:

ABH	Dorma	Glynn Johnson
4420 Series	700 Series	450 Series
1020 SL Series	900 Series	100S Series

### K. Door Trim:

- 1. Provide push plates 6 inches wide x 16 inches high x 0.050 inch thick and beveled 4 edges. Where width of door stile prevents use of 6 inches wide plate, adjust width to fit.
- 2. Provide pull plates 4 inches wide x 16 inches high x 0.050 inch thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches wide plate, adjust width to fit.
- 3. Acceptable manufacturers:

Type	Trimco	Burns	Rockwood
Pull Plate / Push Plate Combo	1835-3	NA	NA
Set			
Offset Door Pull	AP434	VP4252	RM3312

## L. Protection Plates:

- 1. Where bottom rail allows, furnish 10-inch high kick plates and 10-inch high mop plates.
- 2. All doors with door closer to have kick plates.
- 3. Material: 0.050-inch thick stainless steel plates with four beveled edges.
- 4. Countersink screw heads at wood doors.
- 5. Width: 2-inch less door width on stop (push) side and 1-inch less door width on face (pull) side.
- 6. Acceptable manufacturer and types:

Trimco	Burns	Rockwood
K0050	KP	K1050

## M. Door Stops:

- 1. Convex, cast, wall stops.
- 2. Furnish fastener suitable for wall condition.
- 3. Provide wedge type stop for doors with push/pulls.
- 4. Where wall stops are inappropriate provide universal dome type floor stops.
- 5. Acceptable manufacturers and types:

Type	Trimco	Burns	Rockwood
Wall Stop	1270CVSV	NA	NA
Floor Stop	1211	521	441H

#### N. Thresholds and Gasketing:

#### 1. Thresholds:

- a. Returned closed ends at openings where threshold extends beyond frame face.
- b. Bumper threshold with silicone insert where scheduled.
- c. Acceptable manufacturers and types:
- d. Coordinate door undercuts with door hardware.

Type	National Guard	Pemko
Saddle	513	271
Saddle	425	171
Bumper	896	2005

#### 2. Gasketing:

- a. Rigid jamb weatherstip with replaceable neoprene insert.
- b. Include self-adhesive two-sided tape in addition to manufacturer's standard fastener.
- c. Meeting-stile gasketing required at exterior pairs of doors and doors in smoke partitions.
- d. TPE adhesive fire/smoke gasketing at fire and smoke "S" labeled openings
- e. Door sweep with neoprene insert for exterior out-swing doors.
- f. Acceptable manufacturers and types:

Type	National Guard	Pemko
Rigid	700 NA	2891_PK
Smoke	5075	S773
Door Sweep	200 NA	315CN

#### O. Silencers:

- 1. Grey rubber silencers with injector tool.
- 2. Three silencers at single doors and two silencers at pairs.
- 3. Acceptable manufacturers and types:

Trimco	Rockwood	Burns
1229A	608	500

#### 2.3 KEY CONTROL

- A. Key cabinet: wall mounted with one hook for each lock or cylinder plus fifty extra hooks.
  - 1. One non-removable security tag and one snap-on link duplicate tag per hook.
  - 2. Furnish tools, instructions sheets and accessories required to complete installation.
  - 3. Owner/Owner's representative will place keys in cabinet and complete index card furnished with key system.
  - 4. Acceptable manufacturers:

Lund	Telkee	MMF

#### 2.4 FINISHES

#### A. Conform to ANSI/BHMA A156.18.

1.	Butt Hinges	630	Stainless Steel
	Locks and Latches	626	Satin Chrome
3.	Exit Devices	630	Satin Stainless Steel
4.	Door Closers	689	Spray Painted Aluminum
5.	Pull Plates	630	Satin Stainless Steel
6.	Protection Plates	630	Satin Stainless Steel
7.	Stops and Holders	630	Satin Stainless Steel
	Thresholds/Gasket	AL	Anodized Mil Finished Aluminum

## PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify doors and frames are plumb, square, level and true and free from defects that would prevent proper installation of finish hardware.
- B. Verify power is run to doors requiring electrified hardware.

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- C. Wash down masonry walls and complete painting and staining of doors and frames prior to installation of hardware.
- D. Complete finish flooring at doorways.
- E. Correct conditions that inhibit a proper installation before continuing with work.

#### 3.2 INSTALLATION

- A. Install hardware in compliance with the DHI publication, Installation Guide for Doors and Hardware.
- B. Drill and countersink items not factory prepared for fasteners.
- C. Mount closers on room-side of corridor doors, inside of exterior doors, and stair-side of stairway doors. Use necessary arms, brackets, spacers and plates to accommodate auxiliary hardware and special applications.
- D. Install fire door assemblies to maintain clearances at door edge to frame and meeting edge of pairs of doors in compliance with NFPA 80, providing 1/8-inch clearance at the hinge edge, lock edge, head and between pairs. Provide maximum 3/4-inch undercut at door bottom. Where panic thresholds are used, undercut door to allow 1/8-inch clearance between door and threshold.
- E. Trim, cut, and notch thresholds and saddles neatly to minimally fit the profile of the door frame. Set thresholds in bed of mastic sealant, forming tight seal between threshold and surface to which set.
- F. Use only fasteners furnished by manufacturer for installation as recommended by manufacturer.
- G. Install blocking material for all wall mounted door stops at height appropriate to contact door trim.
- H. Install weather-strip prior to installation of door closers and exit devices. Do not cut or notch weather-strip.
- I. Locate electric hinges at second hinge from bottom of frame.
- J. Termination of wiring: Ensure wiring is in place and is connected for proper operation of hardware.

## 3.3 FIELD QUALITY CONTROL

- A. Verify doors open and close smoothly without rubbing or catching and have positive latching where scheduled. Verify fire rated doors are installed with clearances in compliance with NFPA 80.
- B. Test electrified hold open devices tied into fire alarm system to confirm release upon activation of fire alarm. Test electrified hardware and access control to verify systems operate as directed in mode of operation. Where hardware is found to be inoperable, repair or replace with new.

## 3.4 ADJUSTING AND CLEANING

- A. Upon substantial completion, make final adjustments to door closers and other items of hardware after balance of heating and ventilating equipment to ensure doors close and latch properly.
- B. Clean and polish all exposed hardware surfaces in accordance with manufacturer's recommended procedures.

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- C. Clean or repair pencil or tool marks from adjacent surfaces damaged or soiled by work of this Section.
- D. Recycle cardboard boxes and paper products used in packaging and transport of finish hardware.

#### 3.5 PROTECTION

- A. Remove hardware prior to painting or finishing door and frame. Wrap or mask exposed hardware that cannot be removed until date of substantial completion to avoid exposure to paint, solvents, and abuse.
- B. Repair or replace hardware damaged during construction at least two weeks prior to date of substantial completion.

#### 3.6 SCHEDULES

- A. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
- B. Where items of hardware arent definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.

#### Manufacturer List

<u>Code</u>	<u>Name</u>
ABH	ABH Manufacturing Inc
BST	Best Access Systems
BY	By Others
DOR	Dorma Door Controls
NGP	National Guard
PRE	Precision
STN	Stanley
TRM	Trimco

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SCREWS/EXPANSION ANC.

1/4-20 SSMS/EA STAINLESS MACHINE

## Option List

<u>Code</u>	<u>Description</u>
$\overline{C}$	Quick Connect Wiring System
N	Thru-Bolt w/ Flow-Thru
DE	DELAYED EGRESS
FL	Fire Exit Hardware
LD	Less Dogging
TS	TOUCHBAR MONITORING SWITCH
CFC	CUT FOR CYLINDER
CSK	COUNTER SINKING OF KICK and MOP PLATES
FSE	Fail Secure
LBR	LESS BOTTOM ROD
MCS	Mullion Cap Spacer
MLR	MOTORIZED LATCH RETRACTION
RQE	REQUEST TO EXIT
SIA	ABRASIVE COATING
VIB	Double Visual Indictor Option
WTS	Weatherized Touchbar Monitoring Switch
BSHD	Blade Stop Spacer
C181	CAM-ADAMS RITE MS CAM
90541	ANGLE JAMB BRACKET
7/8"LTC	7/8" Lip-To-Center Strike
5001-118	ANSI Strike - 1 1/8" Lip
EPT Prep	EPT Prep
B4E-HEAVY-KP	BEVELED 4 EDGES - KICK PLATES

## Finish List

<u>Code</u>	<u>Description</u>
N	Off White
AL	Aluminum
626	Satin Chromium Plated
630	Satin Stainless Steel
689	Aluminum Painted
316S	316 Satin Stainless Steel
626W	Weatherized Satin Chrome
GREY	Grey
US26D	Chromium Plated, Dull
US32D	Stainless Steel, Dull

## Hardware Sets

HARDWA	HARDWARE GROUP: 01				
DOORS:	DOORS: 100-1, 100-3				
QTY	DESCRIPTION	MODEL	FIN.	MAN.	
2	CONTINUOUS HINGES	661HD	689	STN	
1	REMOVEABLE MULLION	SL-60	AL	SPL	
1	CYLINDER & CORE	MORTISE TYPE / SFIC	626	BST	
2	PANIC DEVICE	2101 CD	626W	PRE	

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2	DOGGING CYLINDERS &	MORTISE TYPE / SFIC	626	BST
	CORE			
2	DOOR PULLS	AP434J-42"	316S	TRM
2	DOOR CLOSERS	8916FC SPA BSHD	689	DOR
2	OVERHEAD STOPS	1020SL	630	ABH
1	THRESHOLD	896N SIA	689	NGP
2	DOOR SWEEPS	1015V	689	NGP

NOTE: WEATHER SEALS BY ALUMINUM DOOR/FRAME MANUFACTURER. COORDINATE DOOR HARDWARE WITH ALUMINUN DOOR/FRAME MANUFACTURER.

HARDW	HARDWARE GROUP: 02					
DOORS:	DOORS: 100-2					
QTY	DESCRIPTION	MODEL	FIN.	MAN.		
2	CONTINUOUS HINGES	661HD PREP'D FOR EPT	689	STN		
2	ELEC. POWER TRANSFER	EPT-12C	689	ABH		
1	REMOVEABLE MULLION	KR SL-60	689	SPL		
1	MULLION CYLINDER &	1E-74 PATD	626	BST		
	CORE					
1	ELEC. PANIC DEVICE	C-MLR WTS 2103 CD	626W	PRE		
1	TRIM CYLINDER & CORE	12E-72 PATD	626	BST		
1	ELEC. PANIC DEVICE	C-MLR2101WTS CD	626W	PRE		
1	POWER SUPPLY	RPSMLR2BB	PTD	PRE		
2	DOGGING CYLINDERS &	1E-74 PATD	626	BST		
	CORE					
2	WIRING HARNESS	WH-129P		PRE		
2	WIRING HARNESS	XX-P (LENGTH AS REQ'D)		PRE		
2	DOOR PULLS	AP434J-42"	316S	TRM		
2	DOOR CLOSERS	8916FC SPA BSHD	689	DOR		
2	OVERHEAD STOPS	1020SL	630	ABH		
1	THRESHOLD	896N SIA	689	NGP		
2	DOOR SWEEPS	200NA	689	NGP		
1	WIRING DIAGRAM	POINT TO POINT				
1	CARD READER	BY SECURITY CONTRACTOR				

NOTE: WEATHER SEALS BY ALUMINUM DOOR/FRAME MANUFACTURER. COORDINATE DOOR HARDWARE WITH ALUMINUN DOOR/FRAME MANUFACTURER.

OPERATION: OPEN HOURS: ACCESS CONTROL SCHEDULES LATCHBOLTS OF PANIC DEVICES HELD IN RETRACTED POSITION ALLOWING MANUAL PUSH/PULL OPERATION. CLOSED HOURS: DOORS CLOSED AND LOCKED. ACCESS VIA CARD READER. WTS SWITCHES TO ACT AS REQUEST TO EXIT. MANUAL EGRESS ALWAYS ALLOWED. JAMBS AND HEAD BE EQUIPPED WITH NECESSARY CONDUITS FOR SPECIFIED COMPONENTS. SEE ELECTRICAL DRAWINGS FOR DETAILS. COORDINATE WIRING AND INSTALLATION WITH GC / EC.

HARDV	HARDWARE GROUP: 03				
DOORS	DOORS: 101-1, 101-2, 101-3				
QTY	DESCRIPTION	MODEL	FIN.	MAN.	
2	CONTINUOUS HINGES	661HD PREP'D FOR EPT	689	STN	
2	DOOR PULLS	AP434J-42"	316S	TRM	
2	DUMMY TOUCH BARS	671	626W	PRE	
2	DOOR CLOSERS	8916FC SPA BSHD	689	DOR	

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2	OVERHEAD STOPS	1020SL	630	ABH
NOTE: W	EATHER SEALS BY ALUMINUM D	OOR/FRAME MANUFACTURER. CO	ORDINATE	DOOR
HARDW <i>A</i>	ARE WITH ALUMINUN DOOR/FRA	ME MANUFACTURER.		

HARDWARE GROUP: 04 ALL HARDWARE BY FRP MANUFACTURER, HURRICANE RATED						
DOORS: 101-4, 101-5, 101-6, 121-1, 121-2, 121-3, 121-4						
QTY	DESCRIPTION	MODEL	FIN.	MAN.		
16	16 CYLINDERS AS REQUIRED 626 BST					

HARDWARE GROUP: 05						
DOORS:	DOORS: 102					
QTY	DESCRIPTION	MODEL	FIN.	MAN.		
3	HINGES	FBB179 4½" x 4½" NRP	630	STN		
1	CLASSROOM LOCKSET	9K7R14D	630	BST		
1	DOOR CLOSER W/ STOP	8916FC DS BSHD	689	DOR		
1	KICK PLATE	K0050 10" x 2" LDW	630	TRM		
1	MOP PLATE	KM050 6" x 1" LDW	630	TRM		
SET	GASKETING	5075 PREIMETER	BLK	NGP		

HARDWARE GROUP: 06					
DOORS:	DOORS: 103, 107, 111-1				
QTY	DESCRIPTION	MODEL	FIN.	MAN.	
3	HINGES	FBB179 4½" x 4½"	630	STN	
1	STOREROOM LOCKSET	9K714D	630	BST	
1	KICK PLATE	K0050 10" x 2" LDW	630	TRM	
1	WALL STOP	1270CVSV	626	TRM	
3	SILENCERS	1229A	GRY	TRM	

HARDWA	HARDWARE GROUP: 07					
DOORS:	DOORS: 104-1					
QTY	DESCRIPTION	MODEL	FIN.	MAN.		
3	HINGES	FBB179 4½" x 4½"	630	STN		
1	STOREROOM LOCKSET	9K714D	630	BST		
1	DOOR CLOSER W/ STOP	8916FC IS	689	DOR		
1	KICK PLATE	K0050 10" x 2" LDW	630	TRM		
1	MOP PLATE	KM050 6" x 1" LDW	630	TRM		
3	SILENCERS	1229A	GRY	TRM		

HARDWARE GROUP: 08						
DOORS:	DOORS: 105					
QTY	DESCRIPTION	MODEL	FIN.	MAN.		
3	HINGES	FBB179 4½" x 4½"	630	STN		
1	STOREROOM LOCKSET	9K714D	630	BST		
1	KICK PLATE	K0050 10" x 2" LDW	630	TRM		
1	OVERHEAD STOP	700S series x 7090	626	DOR		
3	SILENCERS	1229A	GRY	TRM		

HARDW	HARDWARE GROUP: 09					
DOORS	DOORS: 106, 108-2					
QTY	DESCRIPTION	MODEL	FIN.	MAN.		
3	HINGES	FBB179 4½" x 4½"	630	STN		
1	STOREROOM LOCKSET	9K714D	630	BST		
1	DOOR CLOSER	8916FC	689	DOR		
1	DOOR CLOSER	8916FC SIS (DOOR# 108-2	689	DOR		
		ONLY)				
1	KICK PLATE	K0050 10" x 2" LDW	630	TRM		
1	WALL STOP	1270CVSV	626	TRM		
3	SILENCERS	1229A	GRY	TRM		

HARDWARE GROUP: 10					
DOORS	DOORS:108-1, 111-2				
QTY	DESCRIPTION	MODEL	FIN.	MAN.	
3	HINGES	FBB179 4½" x 4½" NRP	630	STN	
1	STOREROOM LOCKSET	9K714D	630	BST	
1	KICK PLATE	K0050 10" x 2" LDW	630	TRM	
1	OVERHEAD STOP	900S series	626	DOR	
3	SILENCERS	1229A	GRY	TRM	

HARDW	HARDWARE GROUP: 11					
DOORS:	DOORS: 110, 111, 116, 117, 118, 119					
QTY	DESCRIPTION	MODEL	FIN.	MAN.		
3	HINGES	FBB168 4½" x 4½" NRP	630	STN		
1	DEADBOLT	83T7S	630	BST		
1	PUSH/PULL PLATE SET	1835-3 4" x 16" CYLT x CFC	710CU	TRM		
1	DOOR CLOSER W/ STOP	8916FC DS BSHD	689	DOR		
1	KICK PLATE	K0050 10" x 2" LDW	630	TRM		
1	MOP PLATE	KM050 6" x 1" LDW	630	TRM		
1	GASKETING	5075	BLK	NGP		

HARDV	HARDWARE GROUP: 12					
DOORS	DOORS: 109, 120					
QTY	DESCRIPTION	MODEL	FIN.	MAN.		
6	HINGES	FBB179 4½" x 4½" NRP	630	STN		
2	FLUSH BOLTS	3917	626	TRM		
1	DUST PROOF STRIKE	3910N	626	TRM		
1	DEADBOLT	83T7L	626	BST		
2	FLUSH PULLS	1111A	630	TRM		
2	KICK PLATE	K0050 10" x 2" LDW	630	TRM		
2	MOP PLATE	KM050 6" x 1" LDW	630	TRM		
2	OVERHEAD HOLDERS	900H series	626	DOR		
2	SILENCERS	1229A	GRY	TRM		

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HARDV	HARDWARE GROUP: 13					
DOORS	DOORS: 112, 114					
QTY	DESCRIPTION	MODEL	FIN.	MAN.		
3	HINGES	FBB179 4½" x 4½"	630	STN		
1	CLASSROOM LOCKSET	9K7R14D	630	BST		
1	DOOR CLOSER HO	8916FC HO	689	DOR		
1	KICK PLATE	K0050 10" x 2" LDW	630	TRM		
1	MOP PLATE	KM050 6" x 1" LDW	630	TRM		
1	WALL STOP	1270CVSV	626	TRM		
1	GASKETING	5075	BLK	NGP		

HARDV	HARDWARE GROUP: 14					
DOORS	DOORS: 112-1, 113-1, 115-1					
QTY	DESCRIPTION	MODEL	FIN.	MAN.		
3	HINGES	FBB179 4½" x 4½"	630	STN		
1	PRIVACY SET	9K0L14D	630	BST		
1	DOOR BOLT OCCUPANCY	B571	626	SCH		
1	KICK PLATE	K0050 10" x 2" LDW	630	TRM		
1	MOP PLATE	KM050 6" x 1" LDW	630	TRM		
1	WALL STOP	1270CVSV	626	TRM		
1	GASKETING	5075	BLK	NGP		

HARDWA	HARDWARE GROUP: 15					
DOORS:	DOORS: 114-1					
QTY	DESCRIPTION	MODEL	FIN.	MAN.		
3	HINGES	FBB179 4½" x 4½" NRP	630	STN		
1	STOREROOM LOCKSET	9K714D	630	BST		
1	MOP PLATE	K0050 6" x 1" LDW	630	TRM		
1	WALL STOP	1270CVSV	626	TRM		
3	SILENCERS	1229A	GRY	TRM		

HARDWARE GROUP: 16					
DOORS: 113, 115					
QTY	DESCRIPTION	MODEL	FIN.	MAN.	
3	HINGES	FBB179 4½" x 4½"	630	STN	
1	CLASSROOM LOCKSET	9K7R14D	630	BST	
1	DOOR CLOSER	8916FC	689	DOR	
1	KICK PLATE	K0050 10" x 2" LDW	630	TRM	
1	MOP PLATE	KM050 6" x 1" LDW	630	TRM	
SET	GASKETING	5075 PREIMETER	BLK	NGP	

HARDWARE GROUP: 17				
DOORS: 118-1, 119-1				
QTY	DESCRIPTION	MODEL	FIN.	MAN.
3	HINGES	FBB168 4½" x 4½" NRP	630	STN
1	PUSH/PULL PLATE SET	1835-3 4" x 16"	710CU	TRM
1	DOOR CLOSER W/ STOP	8916FC DS BSHD	689	DOR

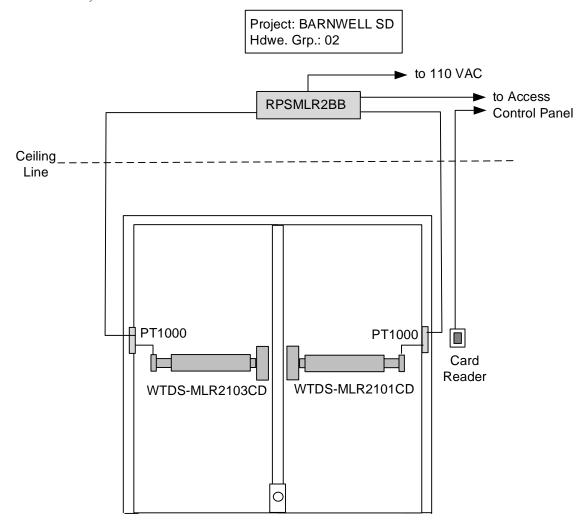
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1	KICK PLATE	K0050 10" x 2" LDW	630	TRM
1	MOP PLATE	KM050 6" x 1" LDW	630	TRM
1	GASKETING	5075	BLK	NGP

HARDWARE GROUP: 18				
DOORS: 104-2				
QTY	DESCRIPTION	MODEL	FIN.	MAN.
2	CYLINDERS & CORES	MORTISE TYPE SFIC	626	BST

HARDY	WARE GROUP: 19			
DOORS	S: MISC.			
QTY	DESCRIPTION	MODEL	FIN.	MAN.
4	MASTER KEYS			BST
6	SFIC CORES	KEYED TO SYSTEM		BST
1	KEY CABINET			
2	DOOR CLOSERS	8916FC		DOR
1	CLASSROOM LOCKSET	9K7R14D	626	BST
2	WALL STOPS	1270CVSV	626	TRM

Tetra Tech DOOR HARDWARE 213-207015-24001 08 71 00 - 17



NOTE: Balance of weather-stripping by Aluminum Frame/Door manufacturer. Coordinate door hardware with Aluminum Frame/Door manufacturer.

Operation: Open Hours: Access control schedules latchbolts of exit device held in retracted position allowing manual push / pull operation. Closed Hours: Doors closed and locked. WTS switch to act as Request to Exit. Manual egress always allowed. Jambs / Head to be equipped with necessary conduit for specified components. See electrical drawings for details. Coordinate wiring and installation with GC / EC.

END OF SECTION 08 71 00

#### SECTION 08 80 00 - GLAZING

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Glass products.
  - 2. Laminated glass.
  - 3. Glazing sealants.

## 1.2 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For glass.
- B. Product test reports.
- C. Preconstruction adhesion and compatibility test report.
- D. Sample warranties.

## 1.5 QUALITY ASSURANCE

A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

#### 1.6 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
  - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

#### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:
  - 1. Design Wind Pressures: As indicated on Drawings.
  - 2. Design Snow Loads: As indicated on Drawings.
  - 3. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.
- B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

## 2.2 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. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
- 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. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

## 2.3 LAMINATED GLASS

- A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Eastman Chemical Company.
    - b. Kuraray America, Inc.
  - 2. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
  - 3. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
  - 4. Interlayer Color: Clear unless otherwise indicated.

#### 2.4 GLAZING SEALANTS

#### A. General:

- 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
- 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.
- B. Neutral-Curing Silicone Glazing Sealant, Class 25: Complying with ASTM C920, Type S, Grade NS, Use NT.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Bostik, Inc.
    - b. <u>GE Construction Sealants; Momentive Performance Materials Inc.</u>
    - c. <u>Pecora Corporation</u>.
    - d. <u>Permathane®/Acryl-R®; ITW Polymers Sealants North America</u>.
    - e. <u>Polymeric Systems, Inc.</u>
    - f. Sika Corporation.
    - g. The Dow Chemical Company.
    - h. Tremco Incorporated.

2. Applications: Interior windows.

## 2.5 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

## PART 3 - EXECUTION

#### 3.1 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

## 3.2 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.

## 3.3 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 contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

#### 3.4 LAMINATED GLASS SCHEDULE

- A. Clear Laminated Glass Type: Two plies of fully tempered float glass.
  - 1. Minimum Thickness of Each Glass Ply: As indicated.
  - 2. Interlayer Thickness: 0.030 inch.
  - 3. Safety glazing required.
  - 4.

END OF SECTION 08 80 00

#### SECTION 08 91 00 - STATIONARY BLADE WALL LOUVERS

#### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

A. Extruded aluminum combination louvers with stationary drainable front blades and airfoil shape adjustable rear blades.

## 1.2 RELATED SECTIONS

A. Section 23 09 13 – Instrumentation and Control Devices for HVAC.

#### 1.3 REFERENCES

- A. AAMA 2604 High Performance Organic Coatings on Architectural Extrusions and Panels.
- B. AAMA 2605 High Performance Organic Coatings on Architectural Extrusions and Panels.
- C. AMCA 500 Test Methods for Louvers, Dampers and Shutters.
- D. AMCA 511 Certified Ratings Program for Air Control Devices.
- E. AMCA 550 High Velocity Wind Driven Rain Resistant Louvers.
- F. ASCE 7 Minimum Design Loads for Buildings and Other Structures.
- G. ASTM D822 Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
- H. ASTM D4214 Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
- I. ASTM D2244 Standard Test Method for Calculation of Color Differences From Instrumentally Measured Color Coordinates.
- J. Miami-Dade County Building Code Compliance Office (BCCO) Miami-Dade Notice of Acceptance,
- K. Florida Building Code (FBC) FBC Notice of Acceptance
- L. USGBC: U.S. Green Building Council LEED® Rating System.

## 1.4 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.

- C. Vertical Louver: Louver with vertical blades; i.e., the axes of the blades are vertical.
- D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- E. Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

### 1.5 ACTION SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Product Data: For each product to be used, including:
  - 1. Manufacturer's product data including performance data.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Installation methods.

# C. Shop Drawings:

- 1. Submit shop drawings indicating materials, construction, dimensions, accessories, and installation details.
- D. Product Schedule: For louvers. Use same designations indicated on Drawings.
- E. Samples: Submit sample of louver to show frame, blades, bird screen, gutters, downspouts, vertical supports, sill, accessories, finish, and color.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of louver, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturer's warranties.

# 1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. The manufacturer shall have implemented the management of quality objectives, continual improvement, and monitoring of customer satisfaction to assure that customer needs and expectations are met.
  - 2. Manufacturer shall be International Organization for Standardization (ISO) 9001 accredited.
- B. Product Qualifications:

- 1. Louvers licensed to bear AMCA Certified Ratings Seal. Ratings based on tests and procedures performed in accordance with AMCA 511 and comply with AMCA Certified Ratings Program. AMCA Certified Ratings Seal applies to air performance and water penetration ratings.
- 2. Miami-Dade County Code Compliance Office: Checklist #0240 for the approval of louvers (including gable end louvers).
- 3. Louver shall be certified to Miami-Dade standards TAS 201 (Large Missile Impact), TAS 202 (Uniform Static Air Pressure) and TAS 203 (Cyclic Wind Loading).
- 4. Louvers licensed to bear AMCA Certified Ratings Seal. Ratings based on tests and procedures performed in accordance with AMCA 500-L, AMCA 511 and comply with AMCA Certified Ratings Program. AMCA Certified Ratings Seal applies to air performance and water penetration ratings.
- 5. Recycled Content: Provide louver that incorporate recycled content materials. The louver shall consist of the following recycled content:
  - a. Fabricated aluminum recycled content 73% by weight. 18% post-consumer, 55% pre-consumer.

# 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store materials in a dry area indoors, protected from damage and in accordance with manufacturer's instructions.
- C. Handling: Protect materials and finishes during handling and installation to prevent damage.
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

### 1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

### 1.10 WARRANTY

- A. Manufacturer shall provide standard limited warranty for louver systems for a period of five years (60 months) from date of installation. When notified in writing from the Owner of a manufacturing defect, manufacturer shall promptly correct deficiencies without cost to the Owner.
- B. Manufacturer shall provide 20 year limited warranty for floropolymer-based finish on extruded aluminum substrates.
  - 1. Finish coating shall not peel, blister, chip, crack or check.
  - 2. Chalking, fading or erosion of finish when measured by the following tests:
    - a. Finish coating shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D4214.

- b. Finish coating shall not change color or fade in excess of 5 NBS units as determined by ASTM D2244 and ASTM D822.
- c. Finish coating shall not erode at a rate in excess of 10%/ 5 year as determined by Florida test sample.
- C. Manufacturer shall provide a 5 year limited warranty for Class I and a 3 year limited warranty for Class II anodized finish on extruded aluminum substrates.
  - 1. Seller warrants the Finish under normal atmospheric conditions.
    - a. Will not crack, craze, flake or blister
    - b. Will not change or fade more than (5) Delta-E Hunter units as determined by ASTM method D-2244
    - c. Will not chalk in excess of ASTM D-4214-07 number (8) rating, determined by the procedure outlined in ASTMD-4214-07 specification test.
  - 2. Any forming or welding must be done prior to finishing. Post forming or welding will void the warranty.
  - 3. This Warranty applies only if the anodized aluminum product is installed in strict accordance with Seller's recommended practices and maintained in accordance with AAMA (American Architectural Manufacturers Association) publication number 609 and 610-09 ("Cleaning and Maintenance Guide for Architecturally Finished Aluminum").

### PART 2 PRODUCTS

# 2.1 MANUFACTURERS

- A. Acceptable Manufacturer:
  - 1. BASIS OF DESIGN: Ruskin Company
- 2.2 MIAMI-DADE COUNTY COMBINATION BLADE LOUVER
  - A. Model: ELC6375DXD as manufactured by Ruskin Company.
  - B. Fabrication:
    - 1. Design: Louver shall include a drainable stationary louver blade section and an integral low leak adjustable airfoil blade control damper within a 6 inch (152 mm) frame. Design incorporates visible mullions or frames at the perimeter of the louver and also at certain intervals within the louver perimeter to support the louver blades. Louver blade sightlines are interrupted at the mullion locations. No rear-mounted blade supports are visible from front. Louver design shall limit span between visible mullions to 120 inches (3048 mm). Gutter drain in head frame and each blade. Downspouts in jambs to drain water from louver for minimum water cascade from blade to blade. Steeply angled integral sill eliminating areas of standing or trapped moisture where mold or mildew may thrive and effect indoor air quality.
    - 2. Frame:

- a. Frame Depth: 6 inches (152 mm).
- b. Material: Extruded aluminum, Alloy 6063-T6.
- c. Wall Thickness: 0.125 inch (3.2 mm), nominal.

### 3. Front Blades:

- a. Style: Drainable 37.5 degree angle on 6-1/8 (156 mm) centers.
- b. Material: Extruded aluminum, Alloy 6063-T6.
- c. Wall Thickness: 0.081 inch (2.1 mm), nominal.

### 4. Rear Blades:

- a. Style: Airfoil shape, adjustable.
- b. Material: Extruded aluminum, Alloy 6063-T6.
- c. Wall Thickness: 0.070 inch (2.1 mm) double wall, nominal, for single section widths through 60 inches (1524 mm).
- d. Linkage: Concealed in frame.
- e. Bearings: Stainless steel sleeve pressed into frame.
- f. Axles: 7/16 inch (11 mm) plated steel hex.
- g. Provide blade and jamb seals. Extruded vinyl blade edge seals and flexible, compressible aluminum jamb seals allowing less than 3 cfm/sf at 1 inch w.g. (0.248 kPa) pressure differential.

### 5. Actuator:

- a. Electric, 24 V, two-position, spring-return.
- 6. Minimum Assembly Size: 12 inches wide by 12 inches high (305 mm x 305 mm).
- 7. Recycled Content: 18% post-consumer. 55% pre-consumer, post-industrial, total of 73% by weight.

### C. Performance Data:

- 1. Performance Ratings: AMCA licensed.
  - a. Based on testing 48 inch by 48 inch (1219 mm by 1219 mm) size unit in accordance with AMCA 500.
- 2. Free Area: 44 percent, nominal.
- 3. Free Area:  $6.99 \text{ sf } (0.65 \text{ m}^{2})$ .
- 4. Maximum Recommended Air Flow through Free Area: 1169 feet per minute (5.94 m/s).
- 5. Air Flow: 8171 cubic feet per minute (231 m<sup>3</sup>/s).
- 6. Maximum Pressure Drop: 0.20 inches w.g. (0.05 kPa).
- 7. Water Penetration: Maximum of 0.01 ounces per square foot (3.1 g/sm) of free area at an air flow of 1250 feet per minute (6.35 m/s) free area velocity when tested for 15 minutes.
- 8. Air Leakage: Maximum of 3.0 cubic feet per minute (0. 09 m³/s) air leakage per square foot of louver face area at 1.0 inches w.g. (0.250 kPa) pressure drop.
- 9. Louver shall be certified to Miami Dade standards TAS 201 (Large Missile Impact), TAS 202 (Uniform Static Air Pressure) and TAS 203 (Cyclic Wind Loading).

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10. Wind load Test Performance: Maximum wind load of +110 PSF (5.27 kPa) and -110 PSF (5.27 kPa) design wind loads tested per Miami-Dade County Uniform Wind Pressure Test PA 202 and maximum cycle test loads of +143 PSF (6.85 kPa) and -143 PSF (6.85 kPa) per Miami-Dade County Uniform Wind Pressure Test PA 203.

### 2.3 ACCESSORIES

- A. Hinged Frame: Continuous piano hinge attached to angle subframe.
- B. Hinged Frame: Continuous piano hinge attached to channel subframe.
- C. Bird Screen:
  - 1. Aluminum: Aluminum, 5/8 inches by 0.040 inch (16 mm by 1 mm), expanded and flattened.
  - 2. Frame: Removable. Rewireable.
- D. Extended Sills:
  - 1. Extruded aluminum, Alloy 6063-T6. Minimum nominal thickness 0.060 inch (1.5 mm).
  - 2. Formed aluminum, Alloy 3003. Minimum nominal thickness 0.081 inch (2.1 mm).
- E. Visible Mullions: Manufacturer's standard horizontal or vertical visible mullions for architectural accent as indicated on drawings.

# 2.4 FINISHES

- A. Finish: Mill finish.
- B. Finish: 70 percent PVDF: Finish shall be applied at 1.2 mil total dry film thickness.
  - 1. Coating shall conform to AAMA 2605. Apply coating following cleaning and pretreatment. Cleaning: AA-C12C42R1X.
    - a. Standard 2-coat.
    - b. Pearledize 70 (2-coat mica).
    - c. 3-coat metallic.
    - d. 3-coat exotic.
  - 2. 20-year finish warranty.
- C. Finish: Prime Coat:
  - 1. Apply alkyd prime coat following chemical cleaning and pretreatment.
  - 2. Primer preparation for field painting.
- D. Finish: Epoxy-Based Painted Finish.
- E. Color: Custom by selected by Architect. Provide color chart.

### F. Anodized Finish:

- 1. Class 2 Clear Anodized.
  - a. Comply with Aluminum Association AA-C21A31. Clear anodized finish 204-R1.
  - b. Apply finish following chemical etching and pretreatment.
  - c. Minimum Thickness: 0.4 mils (0.01 mm), 30 minute anodizing process.

### 2. Class 1 Clear Anodized.

- a. Comply with Aluminum Association AA-C21A41. Clear anodized finish 215-R1.
- b. Apply finish following chemical etching and pretreatment.
- c. Minimum Thickness: 0.7 mils (0.018 mm), 60 minute anodizing process.

### PART 3 EXECUTION

### 3.1 EXAMINATION

A. Inspect areas to receive louvers. Notify the Architect of conditions that would adversely affect the installation or subsequent utilization of the louvers. Do not proceed with installation until unsatisfactory conditions are corrected.

### 3.2 PREPARATION

- A. Clean opening 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 louvers at locations indicated on the drawings and in accordance with manufacturer's instructions.
- B. Install louvers plumb, level, in plane of wall, and in alignment with adjacent work.
- C. The supporting structure shall be designed to accommodate the point loads transferred by the louvers when subject to the design wind loads.

# 3.4 CLEANING

- A. Clean louver surfaces in accordance with manufacturer's instructions.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

#### END OF SECTION

### SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

### PART 1 - GENERAL

### 1.1 SUMMARY

## A. Section Includes:

- 1. Non-load-bearing steel framing systems for interior partitions.
- 2. Suspension systems for interior ceilings and soffits.

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for study and tracks.
- B. Evaluation reports for embossed, high-strength steel studs and tracks.

# 1.4 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

### 2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.

- 2. Protective Coating: ASTM A653/A653M, G40, hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. CEMCO; California Expanded Metal Products Co.
    - b. ClarkDietrich.
    - c. MarinoWARE.
    - d. SCAFCO Steel Stud Company.
    - e. Steel Construction Systems.
  - 2. Minimum Base-Steel Thickness: 0.0269 inch.
  - 3. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide the following:
  - 1. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
      - 1) CEMCO; California Expanded Metal Products Co.
      - 2) ClarkDietrich.
      - 3) MarinoWARE.
      - 4) SCAFCO Steel Stud Company.
      - 5) Steel Construction Systems.
- D. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch-wide flanges.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. ClarkDietrich.
    - b. MarinoWARE.
    - c. SCAFCO Steel Stud Company.
    - d. Steel Construction Systems.
  - 2. Depth: 1-1/2 inches.
  - 3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
- E. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
  - a. ClarkDietrich.
  - b. MarinoWARE.
  - c. SCAFCO Steel Stud Company.
  - d. Steel Construction Systems.
- 2. Configuration: hat shaped.

# 2.3 SUSPENSION SYSTEMS

- A. Hanger Attachments to Concrete:
  - 1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or AC308 as appropriate for the substrate.
    - a. Uses: Securing hangers to structure.
    - b. Type: Torque-controlled, expansion anchor or adhesive anchor.
    - c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
    - d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.
- B. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- C. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- D. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
  - 1. Depth: 2-1/2 inches.

### 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
  - 1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.
  - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

### PART 3 - EXECUTION

# 3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.2 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

- 4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- 5. Curved Partitions:
  - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
  - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
- E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

### 3.3 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counters playing, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
    - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
  - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 5. Do not attach hangers to steel roof deck.
  - 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  - 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
  - 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

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D. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

### SECTION 09 29 00 - GYPSUM BOARD

### PART 1 - GENERAL

### 1.1 SUMMARY

### A. Section Includes:

1. Interior gypsum board.

# 1.2 ACTION SUBMITTALS

### A. Product Data:

- 1. Gypsum wallboard.
- 2. Gypsum board, Type X.
- 3. Gypsum ceiling board.
- 4. Joint treatment materials.
- 5. Sound-attenuation blankets.
- 6. Acoustical sealant.

### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

# 2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

# 2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C1396/C1396M.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. American Gypsum.
    - b. CertainTeed LLC; Saint-Gobain North America.
    - c. Continental Building Products, LLC.

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- d. Georgia-Pacific Gypsum LLC.
- e. National Gypsum Company.
- f. PABCO Gypsum.
- g. USG Corporation.
- 2. Thickness: 1/2 inch.
- 3. Long Edges: Tapered.
- B. Gypsum Board, Type X: ASTM C1396/C1396M.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. American Gypsum.
    - b. CertainTeed LLC; Saint-Gobain North America.
    - c. Continental Building Products, LLC.
    - d. Georgia-Pacific Gypsum LLC.
    - e. National Gypsum Company.
    - f. PABCO Gypsum.
    - g. Panel Rey SA.
    - h. USG Corporation.
  - 2. Thickness: 5/8 inch.
  - 3. Long Edges: Tapered.
- C. Gypsum Ceiling Board: ASTM C1396/C1396M.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. American Gypsum.
    - b. CertainTeed LLC; Saint-Gobain North America.
    - c. Continental Building Products, LLC.
    - d. Georgia-Pacific Gypsum LLC.
    - e. National Gypsum Company.
    - f. PABCO Gypsum.
    - g. USG Corporation.
  - 2. Thickness: 1/2 inch.
  - 3. Long Edges: Tapered.
- 2.4 JOINT TREATMENT MATERIALS
  - A. General: Comply with ASTM C475/C475M.
  - B. Joint Tape:
    - 1. Interior Gypsum Board: Paper.

- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
  - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

# 2.5 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
  - 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
- E. Acoustical Sealant: As specified in Section 07 92 19 "Acoustical Joint Sealants."
- F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

### PART 3 - EXECUTION

# 3.1 INSTALLATION AND FINISHING OF PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C840.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge

trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

- D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- E. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Where indicated on Drawings.
  - 3. Level 3: Where indicated on Drawings.
  - 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
    - a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."
  - 5. Level 5: Where indicated on Drawings.
    - a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

### 3.2 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09 29 00

### SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for interior ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
  - 1. Acoustical Panels: Set of 6-inch-square Samples of each type, color, pattern, and texture.
  - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.
  - 3. Clips: Full-size hold-down clips.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Ceiling suspension-system members.
  - 2. Structural members to which suspension systems will be attached.
  - 3. Method of attaching hangers to building structure.
    - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
  - 4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
  - 5. Size and location of initial access modules for acoustical panels.
  - 6. Items penetrating finished ceiling and ceiling-mounted items including the following:
    - a. Lighting fixtures.

- b. Diffusers.
- Grilles.
- d. Speakers.
- e. Sprinklers.
- f. Access panels.
- g. Perimeter moldings.
- 7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
- 8. Minimum Drawing Scale: 1/8 inch = 1 foot.
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.
- E. Field quality-control reports.

# 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

# 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
  - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
  - 3. Hold-Down Clips: Equal to 2 percent of quantity installed.

# 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

### 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
  - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

# PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

# 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design seismic restraints for ceiling systems.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: Class A according to ASTM E1264.
  - 2. Smoke-Developed Index: 50 or less.
- C. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL or from the listings of another qualified testing agency.

# 2.3 ACOUSTICAL PANELS A1-A4 See A-160

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Basis of Design: Armstrong Ceiling & Wall Solutions.
  - 2. USG Corporation.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Classification: Provide fire-resistance-rated panels as follows:

- 1. Type and Form: Type XII, glass-fiber base with membrane-faced overlay; Form 2, cloth. Binder shall not contain urea formaldehyde.
- 2. Pattern: E (lightly textured).
- D. Color: White.
- E. Light Reflectance (LR): Not less than 0.85.
- F. Noise Reduction Coefficient (NRC): Not less than 0.90.
- G. Articulation Class (AC): Not less than 180 (A1 & A2), 190 (A3).
- H. Edge/Joint Detail: Square.
- I. Thickness: 3/4 inch (A1 & A2), 1 inch (A3).
- J. Modular Size: 24 by 24 inches (A2), 24 by 48 inches (A1 & A3).
- K. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.
- 2.4 METAL SUSPENSION SYSTEM Prelude XL 15/16" exposed tee & Axiom Classic Perimeter Trim (Refer to A-160)
  - A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1. Basis of Design: Armstrong Ceiling & Wall Solutions.
    - 2. USG Corporation.
  - B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M and designated by type, structural classification, and finish indicated.
    - 1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635/C635M.
  - C. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch-wide metal caps on flanges.
    - 1. Structural Classification: Heavy-duty system.
    - 2. End Condition of Cross Runners: Override (stepped) type.
    - 3. Face Design: Flat, flush.
    - 4. Cap Material: Cold-rolled steel.
    - 5. Cap Finish: Painted white.

# 2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
  - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E488/E488M or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.
    - a. Type: Cast-in-place anchors.
    - b. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B633, Class SC 1 (mild) service condition.
    - c. Corrosion Protection: Stainless-steel components complying with ASTM F593 and ASTM F594, Group 1 Alloy 304 or 316.
    - d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B164 for UNS No. N04400 alloy.
  - 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E1190, conducted by a qualified testing and inspecting agency.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
  - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
  - 2. Stainless-Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
  - 3. Nickel-Copper-Alloy Wire: ASTM B164, nickel-copper-alloy UNS No. N04400.
  - 4. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.135-inch-diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.
- F. Hold-Down Clips: Manufacturer's standard hold-down.
- G. Impact Clips: Manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.
- H. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.

- Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- J. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

# 2.6 METAL EDGE MOLDINGS AND TRIM (A4)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Basis of Design: Armstrong World Industries, Inc.
  - 2. USG Corporation.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
  - 1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
  - 2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
  - 3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
- C. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.
  - 1. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

### 2.7 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 07 92 19 "Acoustical Joint Sealants."

### PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements

for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

### 3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C636/C636M and manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
  - 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  - 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
  - 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
  - 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
  - 8. Do not attach hangers to steel deck tabs.
  - 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.

- 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
- 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
  - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
  - 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
  - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
  - 1. Arrange directionally patterned acoustical panels as follows:
    - a. As indicated on reflected ceiling plans.
  - 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
  - 3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
  - 4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
  - 5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
  - 6. Install hold-down clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.
    - a. Hold-Down Clips: Space 24 inches o.c. on all cross runners.
  - 7. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
  - 8. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

# 3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

# 3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
  - 1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEL7
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
  - 1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
  - 2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

### 3.6 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

### SECTION 09 64 66 - WOOD ATHLETIC FLOORING

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes wood athletic flooring.

### 1.3 COORDINATION

- A. Coordinate layout and installation of slab depressions to accommodate layout and height of wood athletic flooring assembly.
- B. Coordinate layout and installation of flooring with floor inserts for gymnasium equipment.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for wood athletic flooring.
- B. Shop Drawings: For each type of floor assembly, include the following:
  - 1. Plans, sections, and attachment details.
  - 2. Details of concrete-slab depressions.
  - 3. Expansion provisions and trim details.
  - 4. Layout, colors, widths, and dimensions of game lines and markers.
- C. Samples: For each exposed product and for each color and texture specified, approximately 12 inches long in size.
  - 1. Include Sample sets showing the full range of normal color and texture variations expected in wood flooring.
  - 2. Include Sample sets showing finishes and game-line and marker paints applied to wood flooring.
- D. Samples for Verification: For each type of wood athletic flooring and accessory required; approximately 12 inches long and of same thickness and material indicated for the Work.

- 1. Include Sample sets showing the full range of normal color and texture variations expected in wood flooring.
- 2. Include Sample sets showing finishes and game-line and marker paints applied to wood flooring.

### 1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each wood athletic flooring system, for tests performed by a qualified testing agency.

### 1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For wood athletic flooring and finish systems to include in maintenance manuals.

# 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver floor assembly materials in unopened cartons or bundles.
- B. Protect wood from exposure to moisture. Do not deliver wood components until after concrete, masonry, plaster, ceramic tile, and similar wet-work is complete and dry.
- C. Store wood components in a dry, warm, well-ventilated, weathertight location and in a horizontal position.

### 1.8 FIELD CONDITIONS

- A. Conditioning period begins not less than seven days before wood athletic flooring installation, is continuous through installation, and continues not less than seven days after installation.
  - 1. Environmental Conditioning: Maintain ambient temperature between 65 and 75 deg F and relative humidity planned for building occupants, but not less than 35 percent or more than 50 percent, in spaces to receive wood athletic flooring during the conditioning period.
  - 2. Wood Conditioning: Move wood components into spaces where they will be installed, no later than beginning of the conditioning period.
    - a. Do not install wood athletic flooring until wood components adjust to relative humidity of, and are at same temperature as, spaces where they are to be installed.
    - b. Open sealed packages to allow wood components to acclimatize immediately on moving wood components into spaces in which they will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- C. Install wood athletic flooring after other finishing operations, including painting, have been completed.

# PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Basis of Design: Robbins Sports Surfaces.
  - 2. Aacer Power Play Wood Flooring

### 2.2 SYSTEM DESCRIPTION

- A. System Type: Fixed.
- B. Overall System Height: As indicated on Drawings. General Contractor shall confirm/coordinate with sports flooring manufacturer recommendation for final depth of recessed slab requirement.

# 2.3 FLOORING MATERIALS

- A. Maple Flooring: Comply with MFMA grading rules for species, grade, and cut.
  - 1. Certification: Provide flooring that carries MFMA mark on each bundle or piece.
- B. Finger-Jointed Strip Flooring: Northern hard maple (Acer saccharum), kiln dried, random length, tongue and groove, and end matched.
  - 1. Grade: MFMA-FJ First.
    - a. Exception: For areas under stacked portion of telescoping bleachers that are normally concealed from view, provide Third and Better Grade.
  - 2. Cut: Edge.
  - 3. Thickness: 25/32 inch.
  - 4. Face Width: 2-1/4 inches.

### 2.4 SUBFLOOR MATERIALS

- A. Vapor Barrier: 1.6 mil polyethylene.
- B. Subfloor
  - 1. 9/16" zero/6 shock pad.
  - 2. Bio-Channel Star subfloor panels. Factory prepared to accept anchor channel.
  - 3. Metal anchor channel.

# 2.5 FINISHES

A. Floor-Finish System: System of compatible components recommended in writing by flooring manufacturer, and MFMA approved.

- 1. Floor-Sealer Formulation: Pliable, penetrating type. MFMA Group 1, Sealers.
- 2. Finish-Coat Formulation: Formulated for gloss finish indicated and multicoat application.
  - a. Type: MFMA Approved.
- 3. Game-Line and Marker Paint: Industrial enamel compatible with finish coats and recommended in writing by manufacturers of finish coats, and paint for this use.

### 2.6 ACCESSORIES

- A. Vapor Retarder: ASTM D4397, polyethylene sheet not less than 6 mils thick.
- B. Thresholds: As specified by Architect.
- C. Fasteners: Type and size recommended by manufacturer, but not less than those recommended by MFMA for application indicated.
- D. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood athletic flooring manufacturer.
- E. Adhesives: Manufacturer's standard for application indicated.

### **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
  - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
    - c. Perform additional moisture tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

### 3.2 PREPARATION

### A. Concrete Slabs:

- 1. Grind high spots and fill low spots on concrete substrates to produce a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge.
- 2. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- 3. Remove coatings including curing compounds and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone; use mechanical methods recommended by manufacturer. Do not use solvents.
- B. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.3 INSTALLATION

- A. Comply with wood athletic flooring manufacturer's written instructions, but not less than written recommendations of MFMA applicable to flooring type indicated.
- B. Pattern: Lay flooring parallel with long dimension of space to be floored unless otherwise indicated.
- C. Expansion Spaces: Provide as indicated, but not less than that required by manufacturer's written instructions and MFMA's written recommendations at walls and other obstructions, and at interruptions and terminations of flooring.
  - 1. Cover expansion spaces with base molding, trim, and saddles, as indicated on Drawings.
- D. Vapor Retarder: Cover entire slab area beneath wood flooring. Install with joints lapped a minimum of 6 inches and sealed.
- E. Underlayment: Install perpendicular to direction of flooring, staggering end joints in adjacent rows.

# F. Sleepers:

- 1. Prime entire slab beneath wood floor area with asphalt primer at coverage rate recommended by manufacturer.
- 2. Install sleepers perpendicular to direction of flooring, staggering end joints a minimum of 24 inches.
- 3. Space 12 inches o.c..
- 4. Shim and level sleepers and install anchors at spacing recommended by manufacturer, but not less than 30 inches o.c.
- 5. Pour asphalt mastic to 1/8 inch above the level of shims.
- 6. Anchor predrilled sleepers through resilient pads.
- G. Channels: Anchor channels to substrate according to manufacturer's written instructions.

- 1. Install wood strip flooring across channels.
- 2. Insert steel clip at each intersection of a flooring strip with a channel.
- H. Strip Flooring: Mechanically fasten perpendicular to supports.
- I. Installation Tolerances: 1/8 inch in 10 feet of variance from level.

### 3.4 SANDING AND FINISHING

- A. Allow installed flooring to acclimate to ambient conditions before sanding.
- B. Follow applicable recommendations in MFMA's "Industry Recommendations for Sanding, Sealing, Court Lining, Finishing, and Resurfacing of Maple Gym Floors."
- C. Machine sand with coarse, medium, and fine grades of sandpaper to achieve a level, smooth, uniform surface without ridges or cups. Remove sanding dust by tack or vacuum.
- D. Finish: Apply seal and finish coats of finish system according to finish manufacturer's written instructions. Provide no fewer than four coats total and no fewer than two finish coats.
  - 1. Water-Based Finishes: Use finishing methods recommended by finish manufacturer to reduce grain raise and sidebonding effect.
  - 2. Game-Line and Marker Paint: Apply game-line and marker paint between final seal coat and first finish coat according to paint manufacturer's written instructions.
    - a. Mask flooring at game lines and markers, and apply paint to produce lines and markers with sharp edges.
    - b. Where game lines cross, break minor game line at intersection; do not overlap lines.
    - c. Apply game lines and markers in widths and colors according to requirements indicated on Drawings.
    - d. Apply finish coats after game-line and marker paint is fully cured.

# 3.5 PROTECTION

- A. Protect wood athletic flooring during remainder of construction period to allow finish to cure and to ensure that flooring and finish are without damage or deterioration at time of Substantial Completion.
  - 1. Do not cover flooring after finishing until finish reaches full cure and not before seven days after applying last finish coat.
  - 2. Do not move heavy and sharp objects directly over flooring. Protect fully cured floor finishes and surfaces with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 09 64 66

### SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

### A. Section Includes:

- 1. Thermoset-rubber base.
- 2. Rubber molding accessories.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.
- E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

### 1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Furnish not less than 10 linear feet for every or fraction thereof, of each type, color, pattern, and size of resilient product installed.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

### 1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F, in spaces to receive resilient products during the following periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

### PART 2 - PRODUCTS

# 2.1 THERMOSET-RUBBER BASE (RB-1, RB-2)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Basis of Design: Roppe Corporation; Roppe Holding Company.
  - 2. Johnsonite; a Tarkett company.
- B. Product Standard: ASTM F1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
  - 1. Style and Location:
    - a. Style B, Cove: Refer to Finish Plan and Schedule.
- C. Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Colors: Refer to Finish Schedule.

# 2.2 RUBBER MOLDING ACCESSORY

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Basis of Design: Roppe Corporation; Roppe Holding Company.
- B. Description: Rubber cap for cove resilient floor covering, nosing for resilient floor covering, reducer strip for resilient floor covering, transition strips.
- C. Profile and Dimensions: As indicated.
- D. Locations: Provide rubber molding accessories in areas indicated.
- E. Colors and Patterns: Refer to Finish Schedule.

# 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
- C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.
- D. Metal Edge Strips: Extruded aluminum with mill finish, nominal 2 inches wide, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.
- E. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

### **PART 3 - EXECUTION**

# 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

# 3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
  - 4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until materials are the same temperature as space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

### 3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
  - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
    - a. Form without producing discoloration (whitening) at bends.
  - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
    - a. Miter corners to minimize open joints.

### 3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
  - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
  - 2. Tightly adhere to substrates throughout length of each piece.
  - 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

### 3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
  - 1. Remove adhesive and other blemishes from surfaces.
  - 2. Sweep and vacuum horizontal surfaces thoroughly.
  - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

### SECTION 09 65 19 - RESILIENT TILE FLOORING

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. Section Includes:
  - 1. Rubber floor tile.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
  - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 2. Show details of special patterns.
- C. Samples for Verification: Full-size units of each color and pattern of floor tile required.
  - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.
- D. Product Schedule: For floor tile. Use same designations indicated on Drawings.

# 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

#### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

### 1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

# 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

# 1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

### 1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

# PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

# 2.2 SOLID VINYL FLOOR TILE SVT-1 thru 4

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Basis of Design: Tarkett iQ Optima.
  - 2. Shaw Contract Group; a Berkshire Hathaway company.
- B. Tile Standard: ASTM F1700.
  - 1. Class: As indicated by product designations.
  - 2. Type: A, Smooth Surface.
- C. Thickness: 0.080 inch.
- D. Size: 12 by 24 inches.
- E. Colors and Patterns: Refer to Finish Plan.

# 2.3 RESILIENT/RECYCLED RUBBER FLOOR TILE (rt-1 AND rt-2)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Basis of Design: DINOFLEX® Recycled Rubber Surfaces sport mat.
  - 2. Johnsonite; a Tarkett company.
- B. Material shall be a non-vulcanized, non-laminated tile product with homogeneous color, composed of post-consumer recycled SBR (styrene butadiene rubber) combined with low odor EPDM (ethylene propylene diene monomer) rubber granules, bound with a proprietary slow-cured MDI water-based polymer. (Essential for superior elasticity and long term durability.)
- C. All tiles shall be produced in block form (not cut from rolled material) sliced and precision cut using computerized numerically controlled (CNC) water-based equipment. Thickness tolerance is a maximum of +/- 0.5mm. (Interlocking tiles must be fully reversible.)
- D. All Recycled Rubber Tiles shall be FloorScore® certified under the criteria developed by the Registration # SCS-FS-02144. (Dinoflex Group LP)
- E. Edge finish product size shall be Interlocking (37" x 37").
- F. Wearing Surface: Smooth.
- G. Thickness: 8mm.
- H. Colors and Patterns: Refer to Finish Plan & Schedule.

# 2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

## PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
  - 4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- E. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  - 1. Lay tiles square with room axis in pattern indicated on Finish Plan.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

### I. Seamless Installation:

1. Heat-Welded Seams: Comply with ASTM F1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

- 2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to fuse sections permanently into a seamless flooring installation. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.
- J. Resilient Terrazzo Accessories: Install according to manufacturer's written instructions.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
  - 1. Remove adhesive and other blemishes from surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.

END OF SECTION 09 65 19

### SECTION 09 67 23 - RESINOUS FLOORING

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. Section Includes:
  - 1. Resinous flooring.
  - 2. Integral cove base accessories.

# 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.
- B. Samples for Verification: For each resinous flooring system required and for each color and texture specified, 6 inches square, applied to a rigid backing by Installer for this Project.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each resinous flooring component.
- C. Material Test Reports: For each resinous flooring system, by a qualified testing agency.
- D. Field quality-control reports.

### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For resinous flooring to include in maintenance manuals.

# 1.6 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

# 1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

# 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.
- C. Close spaces to traffic during resinous flooring installation and for 24 hours after installation unless manufacturer recommends a longer period.

### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

A. Flammability: Self-extinguishing in accordance with ASTM D635.

# 2.2 RESINOUS FLOORING (EPX-1, EPX-2)

- A. Basis of Design: Stonhard, Stontec QBF.
  - 1. Additional approved Manufacturer's
    - a. Plexi-Chemie Plexiflake QBF
- B. Resinous Flooring System: Abrasion-, impact-, and chemical-resistant, aggregate-filled, resinbased monolithic floor surfacing designed to produce a seamless floor and integral cove base.
- C. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Obtain secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from manufacturer recommended in writing by manufacturer of primary materials.

### D. System Characteristics:

1. Color and Pattern: Refer to Finish Schedule.

- 2. Wearing Surface: Smooth.
- 3. Overall System Thickness: 1/16 inch.
- E. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested in accordance with test methods indicated:
  - 1. STONTEC QBF:
    - a. Nominal 1/16" thickness decorative flooring system with stain resistant flooring.
    - b. Prep concrete, apply Stonproof ME7.
    - c. Provide light prep of ME7, apply urethane primer, apply Stonset TG6 grout at desired slope.
    - d. Apply urethane primer and Stontec TRF troweled urethane mortar on floor and cove base.
    - e. Lightly prep urethane mortar apply pigmented undercoat, broadcast flake into wet undercoat.
    - f. Lightly scrape the flake, apply first sealer.
    - g. Lightly sand flake, apply second sealer (texture can be added to sealer for slip resistance.)
- F. System Chemical Resistance: Test specimens of cured resinous flooring system are unaffected when tested in accordance with ASTM D1308 for 50 percent immersion in the following reagents for no fewer than seven days:
- G. Primer: Type recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated.
- H. Waterproofing Membrane: Type recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated.
- I. Reinforcing Membrane: Flexible resin formulation that is recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated and that inhibits substrate cracks from reflecting through resinous flooring.
- J. Body Coats:
  - 1. Products:
    - a. Basis of Design: Stontec QBF.
  - 2. Resin: Urethane.
  - 3. Formulation Description: 100 percent solids.
  - 4. Type: Pigmented.
  - 5. Number of Coats: Two.
  - 6. Thickness of Coats: 1/16 inch.
  - 7. Aggregates: Refer to Finish Schedule.

### 2.3 INTEGRAL COVE BASE ACCESSORIES

A. Precast, Integral Cove Base: Impact-resistant, polymer-resin, cove base moldings with a grit profile to promote adhesion of resinous flooring and recommended in writing by resinous flooring manufacturer.

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Basis of Design: Stonhard/Stontec QBF.
- 2. Radius Cove Base: 4-inch- high base molding that provides approximately 1-inch radius cove at floor-to-wall joint; for adhesive installation as substrate for resinous flooring system to form an integral cove base.
  - a. Preformed Inside and Outside Corners: Provide manufacturer's standard square inside and square outside corners.
- B. Installation Adhesive: As recommended in writing by accessory manufacturer.

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resinous flooring systems.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare and clean substrates in accordance with resinous flooring manufacturer's written instructions for substrate indicated to ensure adhesion.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
  - 1. Roughen concrete substrates as follows:
    - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
    - b. Comply with requirements in SSPC-SP 13/NACE No. 6, with a Concrete Surface Profile of 3 or greater in accordance with ICRI Technical Guideline No. 310.2R, unless manufacturer's written instructions are more stringent.
  - 2. Repair damaged and deteriorated concrete in accordance with resinous flooring manufacturer's written instructions.

- 3. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
  - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
  - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- 4. Alkalinity and Adhesion Testing: Perform tests recommended in writing by resinous flooring manufacturer. Proceed with installation only after substrate alkalinity is not less than 6 pH unless otherwise recommended in writing by flooring manufacturer,
- C. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates in accordance with manufacturer's written instructions.
  - 1. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring in accordance with manufacturer's written instructions.
- D. Resinous Materials: Mix components and prepare materials in accordance with resinous flooring manufacturer's written instructions.

# 3.3 INSTALLATION

- A. Apply components of resinous flooring system in accordance with manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness specified.
  - 1. Coordinate installation of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
  - 2. Cure resinous flooring components in accordance with manufacturer's written instructions. Prevent contamination during installation and curing processes.
  - 3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
- B. Primer: Apply primer over prepared substrate at spreading rate recommended in writing by manufacturer.
- C. Waterproofing Membrane: Apply waterproofing membrane over entire substrate surface, in thickness recommended in writing by manufacturer.
  - 1. Apply waterproofing membrane to integral cove base substrates.
- D. Reinforcing Membrane: Apply reinforcing membrane to entire substrate surface.
- E. Integral Cove Base Accessories: Adhesively install precast accessories before applying flooring coats and in accordance with manufacturer's written instructions.

- F. Field-Formed Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring coats. Apply in accordance with manufacturer's written instructions and details, including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.
  - 1. Integral Cove Base: 4 inches high.
- G. Self-Leveling Body Coats: Apply self-leveling slurry body coats in thickness specified for flooring system.
  - 1. Aggregates: Broadcast aggregates at rate recommended in writing by manufacturer. After resin is cured, remove excess aggregates to provide surface texture indicated.
- H. Troweled or Screeded Body Coats: Apply troweled or screeded body coats in thickness specified for flooring system. Hand or power trowel and grout to fill voids. When body coats are cured, remove trowel marks and roughness using method recommended in writing by manufacturer.
- I. Grout Coat: Apply grout coat to fill voids in surface of final body coat.
- J. Topcoats: Apply topcoats in number indicated for flooring system specified, at spreading rates recommended in writing by manufacturer, and to produce wearing surface specified.

# 3.4 FIELD QUALITY CONTROL

- A. Material Sampling: Owner may, at any time and any number of times during resinous flooring installation, require material samples for testing for compliance with requirements.
  - 1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
  - 2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.
  - 3. If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reinstall flooring materials to comply with requirements.
- B. Core Sampling: At Owner's direction and at locations designated by Owner, take one core sample per 1000 sq. ft. of resinous flooring, or portion of, to verify thickness. For each sample that fails to comply with requirements, take two additional samples. Repair damage caused by coring. Correct deficiencies in installed flooring as indicated by testing.

# 3.5 PROTECTION

A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

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END OF SECTION 09 67 23

### SECTION 09 68 13 - TILE CARPETING

### 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. Modular carpet tile.
- B. Related Requirements:
  - 1. Section 09 65 13 "Resilient Base and Accessories" and Section 09 65 19 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
  - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
  - 1. Carpet Tile: Full-size Sample.
  - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
- C. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- D. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

# 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

# 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
  - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd..

# 1.7 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

# 1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI 104.

### 1.9 FIELD CONDITIONS

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

### 1.10 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

- 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
- 2. Failures include, but are not limited to, the following:
  - a. More than 10 percent edge raveling, snags, and runs.
  - b. Dimensional instability.
  - c. Excess static discharge.
  - d. Loss of tuft-bind strength.
  - e. Loss of face fiber.
  - f. Delamination.
- 3. Warranty Period: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

### 2.1 CARPET TILE CT-1

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Basis of Design: Tarkett USA, Inc.
  - 2. Shaw Contract Group; a Berkshire Hathaway company.
  - 3. Mohawk Group (The); Mohawk Carpet, LLC.
- B. Color: Refer to Finish Schedule.
- C. Pattern: Refer to Finish Schedule.
- D. Fiber Content: 100 percent nylon 6, 6.
- E. Fiber Type: TDX Nylon.
- F. Pile Characteristic: Accuweave patterned load.
- G. Density: 7,513 oz/cu yd.
- H. Pile Thickness: 0.115 inch for finished carpet tile according to ASTM D6859.
- I. Gage: 1/12.
- J. Surface Pile Weight: 12 oz./sq. yd.
- K. Primary Backing/Backcoating: Manufacturer's standard composite materials.
- L. Secondary Backing: Manufacturer's standard material.
- M. Backing System: Manufacturer's standard.
- N. Size: 24 by 24 inches.

# O. Applied Treatments:

- 1. Soil-Resistance Treatment: Manufacturer's standard treatment.
- 2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:
  - a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

### P. Performance Characteristics:

- 1. Appearance Retention Rating: Heavy traffic, 3.0 minimum according to ASTM D7330.
- 2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
- 3. Dry Breaking Strength: Not less than 100 lbf according to ASTM D2646.
- 4. Delamination: Not less than 3.5 lbf/in. according to ASTM D3936.
- 5. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.
- 6. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
- 7. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
- 8. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) according to AATCC 16, Option E.
- 9. Electrostatic Propensity: Less than 1.5 kV according to AATCC 134. Permanent Conductive Fiber.

### 2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

# PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.

- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 30 00 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
  - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
    - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- D. Wood Subfloors: Verify the following:
  - 1. Underlayment over subfloor complies with requirements specified in Section 06 16 00 "Sheathing."
  - 2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- E. Metal Subfloors: Verify the following:
  - 1. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- F. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.
  - 1. Access Flooring Systems: Verify the following:
  - 2. Access floor substrate is compatible with carpet tile and adhesive if any.
  - 3. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of irregularities, gaps greater than 1/8 inch, protrusions more than 1/32 inch, and substances that may interfere with adhesive bond or show through surface.
- G. Proceed with installation only after unsatisfactory conditions have been corrected.

# 3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns indicated on Drawings.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.
- Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.

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C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 13

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### SECTION 09 84 33 - SOUND-ABSORBING WALL UNITS

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

# 1.2 SUMMARY

- A. Section includes shop-fabricated, acoustical panel units tested for acoustical performance, including the following:
  - 1. Sound-absorbing wall panels.

# 1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.
- B. SAA: Sound Absorption Average.

### 1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For unit assembly and installation.
  - 1. Include plans, elevations, sections, and mounting devices and details.
  - 2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
  - 3. Include details at cutouts and penetrations for other work.
  - 4. Include direction of fabric weave and pattern matching.
- C. Samples for Initial Selection: For each type of fabric facing.
  - 1. Include Samples of hardware and accessories involving color or finish selection.
- D. Samples for Verification: For the following products:

- 1. Fabric: Full-width by approximately 36-inch- long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
- 2. Panel Edge: 12-inch-long Sample(s) showing each edge profile, corner, and finish.
- 3. Core Material: 12-inch-square Sample at corner.
- 4. Mounting Devices: Full-size Samples.
- 5. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Electrical outlets, switches, and thermostats.
  - 2. Items penetrating or covered by units including the following:
    - a. Air outlets and inlets.
    - b. Speakers.
    - c. Alarms.
    - d. Sprinklers.
    - e. Access panels.
  - 3. Show operation of hinged and sliding components covered by or adjacent to units.
- B. Product Certificates: For each type of unit.
- C. Sample Warranty: For manufacturer's special warranty.

### 1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

# 1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Fabric: For each fabric, color, and pattern installed, provide length equal to 10 percent of amount installed, but no fewer than 10 sq. yd., full width of bolt.
  - 2. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices, including unopened adhesives.

# 1.9 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
  - 1. Build mockup of typical wall area as shown on Drawings.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

# 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

### 1.11 FIELD CONDITIONS

- A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wetwork in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install units until a permanent level of lighting is provided on surfaces to receive the units.
- C. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

### 1.12 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to the following:
    - a. Acoustical performance.
    - b. Fabric sagging, distorting, or releasing from panel edge.
    - c. Warping of core.
  - 2. Warranty Period: Two years from date of Substantial Completion.

### PART 2 - PRODUCTS

# 2.1 MANUFACTURERS

A. Source Limitations: Obtain wall units specified in this Section from single source from single manufacturer.

# 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - 1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 450 or less.
  - 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

### 2.3 SOUND-ABSORBING WALL UNITS – SAP-1 thru SAP-3

- A. Sound-Absorbing Wall Panel: Manufacturer's standard panel construction consisting of facing material laminated to front face, edges, and back edge border of core.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Basis of Design: Kinetics Noise Control, Inc.
    - a. High impact Hard Side. 1-1/8" thick.
  - 2. Armstrong World Industries
    - a. Sound Soak
  - 3. Mounting: Back mounted with manufacturer's Type A Mounting.
  - 4. Edge Construction: Manufacturer's standard extruded-aluminum or zinc-coated, rolled-steel frame.
  - 5. Edge Profile: Square.
  - 6. Corner Detail in Elevation: Square with continuous edge profile indicated.
  - 7. Acoustical Performance: Sound absorption of according to ASTM C423 for Type A mounting.

- 8. Nominal Thickness: 1-1/8".
- 9. Panel Width: Custom, as indicated on Drawings.
- 10. Panel Height: Custom, as indicated on Drawings.

### 2.4 MATERIALS

- A. Core Materials:
  - 1. 6-7 PCF fiberglass core 1/8" high impact "skin".
- B. Facing Material: Fabric from same dye lot; color and pattern as indicated on Drawings.
  - 1. Manufacturer: Manufacturer Standard Style/Color: TBD.
- C. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit, and as follows:
  - 1. Hard Size Impaling Clips with Adhesive.
  - 2. Rootfast Clips
  - 3. Z-Clip moveable
  - 4. Velcro moveable

# 2.5 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Edge Hardening: For glass-fiber board and mineral-fiber board cores, chemically harden core edges and areas of core where mounting devices are attached.
- C. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
- D. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
  - 1. Square Corners: Tailor corners. Heat-seal vinyl fabric seams at corners.
  - 2. Radius and Other Nonsquare Corners: Attach facing material so there are no seams or gathering of material.
  - 3. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent units.
- E. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
  - 1. Thickness.
  - 2. Edge straightness.
  - 3. Overall length and width.
  - 4. Squareness from corner to corner.
  - 5. Chords, radii, and diameters.

### PART 3 - EXECUTION

# 3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align fabric pattern and grain as indicated on Drawings.

### 3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch in 48 inches, noncumulative.
- B. Variation of Joint Width: Not more than 1/32-inch variation from hairline/reveal line in 48 inches, noncumulative.

### 3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 09 84 33

### SECTION 09 91 23 - INTERIOR PAINTING

### 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. Primers.
  - 2. Water-based finish coatings.
  - 3. Floor sealers and paints.
  - 4. Dry fall coatings.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
  - 1. Include preparation requirements and application instructions.
  - 2. Indicate VOC content.
- B. Samples: For each type of topcoat product.
- C. Samples for Initial Selection: For each type of topcoat product.
- D. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Apply coats on Samples in steps to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.

# 1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

- a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
- b. Other Items: Architect will designate items or areas required.
- 2. Final approval of color selections will be based on mockups.
  - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
- 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

### 1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

### PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. BASIS OF DESIGN: Sherwin-Williams Company (The).
  - 2. PPG Paints
  - 3. Benjamin Moore & Co.
- B. Source Limitations: Obtain each paint product from single source from single manufacturer.

### 2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

- 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
- 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. Colors: Refer to Finish Schedule.
  - 1. Thirty percent of surface area will be painted with deep tones.

# 2.3 PRIMERS

- A. Interior/Exterior Latex Block Filler: Water-based, high-solids, emulsion coating formulated to bridge and fill porous surfaces of exterior concrete masonry units in preparation for specified subsequent coatings.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: (SAME MANUFACTURER AS FINISH COAT)
    - a. BASIS OF DESIGN: Sherwin-Williams Company (The).
    - b. PPG Paints
    - c. Benjamin Moore & Co.
- B. Sprayed Concrete Ceilings Alkali-Resistant, Water-Based Primer: Water-based primer formulated for use on alkaline surfaces, such as plaster, vertical concrete, and masonry.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. BASIS OF DESIGN: Sherwin-Williams Company (The).
    - b. PPG Paints
    - c. Benjamin Moore & Co.
- C. Interior, Institutional Low-Odor/VOC Primer Sealer: Water-based primer sealer with low-odor characteristics and a VOC of less than 10 grams per liter for use on new interior plaster, concrete, and gypsum wallboard surfaces that are subsequently to be painted with latex finish coats.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: (SAME MANUFACTURER AS FINISH COAT)
    - a. BASIS OF DESIGN: Sherwin-Williams Company (The).
    - b. PPG Paints
    - c. Benjamin Moore & Co.
- D. Water-Based Rust-Inhibitive Primer: Corrosion-resistant, water-based-emulsion primer formulated for resistance to flash rusting when applied to cleaned, interior ferrous metals subject to mildly corrosive environments.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: (SAME MANUFACTURER AS FINISH COAT)
  - a. BASIS OF DESIGN: Sherwin-Williams Company (The).
  - b. PPG Paints
  - c. Benjamin Moore & Co.

### 2.4 WATER-BASED FINISH COATS

- A. GWB & CMU: Interior, Latex, Institutional Low Odor/VOC, Semigloss: White or colored latex paint with low-odor characteristics and a VOC of less than 10 grams per liter, for use in areas, such as hospitals and other occupied buildings, where the odor and VOC levels of conventional latex products would preclude their use.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: (SAME MANUFACTURER AS FINISH COAT)
    - a. BASIS OF DESIGN: Sherwin-Williams Company (The).
    - b. PPG Paints
    - c. Benjamin Moore & Co.
- B. DOORS AND FRAMES: Interior, Latex, Institutional Low-Odor/VOC, Gloss: White or colored latex paint with low-odor characteristics and a VOC of less than 10 grams per liter, for use in areas, such as hospitals and other occupied buildings, where the odor and VOC levels of conventional latex products would preclude their use.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: (SAME MANUFACTURER AS FINISH COAT)
    - a. BASIS OF DESIGN: Sherwin-Williams Company (The).
    - b. PPG Paints
    - c. Benjamin Moore & Co.

# 2.5 FLOOR SEALERS AND PAINTS

- A. Water-Based Concrete Floor Sealer: Clear, water-based, acrylic-copolymer-emulsion sealer formulated for oil, gasoline, alkali, and water resistance and for use on concrete traffic surfaces.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. H&C® Decorative Concrete Products; a brand of Sherwin-Williams Co.
    - b. PPG Paints.
    - c. Sherwin-Williams Company (The).

# 2.6 DOME CEILING

A. Dry Fall, Latex, Eggshell: Pigmented, water-based, emulsion-type, fast-drying coating for use on interior plaster, concrete, gypsum board, primed wood, and metal ceilings.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: (SAME MANUFACTURER AS FINISH COAT)
  - a. BASIS OF DESIGN: Sherwin-Williams Company (The).
  - b. PPG Paints
  - c. Benjamin Moore & Co.
- 2. Gloss and Sheen Level: Manufacturer's standard eggshell finish.

### PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Concrete: 12 percent.
  - 2. Masonry (Clay and CMUs): 12 percent.
  - 3. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

# 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

### 3.3 INSTALLATION

- A. Apply paints according to manufacturer's written instructions.
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- 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.
- E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed in occupied spaces:
    - a. Equipment, including panelboards.

- b. Metal conduit.
- c. Plastic conduit.
- d. Other items as directed by Architect.

# 3.4 FIELD QUALITY CONTROL

- A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.

### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
  - 1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
  - 2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
  - 3. Allow empty paint cans to dry before disposal.
  - 4. Collect waste paint by type and deliver to recycling or collection facility.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.6 INTERIOR PAINTING SCHEDULE – SEE FINISH SCHEDULE A-801

- A. See Finish Schedule on Drawing Sheet A-801.
- B. Concrete Substrates, Nontraffic Surfaces:
  - 1. Latex System:
    - a. Prime Coat: Matching topcoat.
    - b. Intermediate Coat: Matching topcoat.
    - c. Topcoat: Interior latex paint, satin.

- 2. Institutional Low-Odor/VOC Latex System:
  - a. Prime Coat: Interior, institutional low-odor/VOC primer sealer.
  - b. Intermediate Coat: Matching topcoat.
  - c. Topcoat: Interior latex, institutional low odor/VOC, satin.
- C. Concrete Substrates, Traffic Surfaces:
  - 1. Latex Floor Enamel System:
    - a. Prime Coat: Matching topcoat
    - b. Intermediate Coat: Matching topcoat.
    - c. Topcoat: Latex floor paint, low gloss.
  - 2. Water-Based Concrete Floor Sealer System:
    - a. First Coat: Matching topcoat.
    - b. Topcoat: Water-based concrete floor sealer.
  - 3. Solvent-Based Concrete Floor Sealer System:
    - a. First Coat: Matching topcoat.
    - b. Topcoat: Solvent-based concrete floor sealer.
- D. CMU Substrates:
  - 1. Institutional Low-Odor/VOC Latex System:
    - a. Block Filler: Interior/exterior latex block filler.
    - b. Intermediate Coat: Matching topcoat.
    - c. Topcoat: Interior, latex, institutional low odor/VOC, satin.
- E. Steel Substrates:
  - 1. Institutional Low-Odor/VOC Latex System:
    - a. Prime Coat: Water-based rust-inhibitive primer.
    - b. Intermediate Coat: Matching topcoat.
    - c. Topcoat: Interior, latex, institutional low odor/VOC, semigloss.
- F. Spray-Textured Ceiling Substrates:
  - 1. Latex System: Spray applied:
    - a. Prime Coat: Matching topcoat.
    - b. Intermediate Coat: Matching topcoat.
    - c. Topcoat: Interior, latex, low sheen.
- G. Gypsum Board Substrates:
  - 1. Institutional Low-Odor/VOC Latex System:

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- a. Prime Coat: Interior, institutional low-odor/VOC primer sealer.
- b. Intermediate Coat: Matching topcoat.
- c. Topcoat: Interior, latex, institutional low odor/VOC, satin and semigloss.

END OF SECTION 09 91 23

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### SECTION 10 14 53 - TRAFFIC SIGNAGE

### PART 1 – GENERAL

# 1.1 WORK INCLUDED

- A. Signs.
- B. Posts.
- C. Fabricating and installing traffic signs in accordance with details shown on construction plans and the Manual on Uniform Traffic Control Devices.

# 1.2 REFERENCES (LATEST REVISION)

- A. ASTM A 123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- B. ASTM A 153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- C. ASTM A 193 Alloy-Steel and Stainless-Steel Bolting for High Temperature or High-Pressure Service and Other Special Purpose Applications.
- D. ASTM A 307 Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- E. ASTM A 615 Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- F. ASTM B 209 Aluminum and Aluminum-Alloy Sheet and Plate.
- G. ASTM B 211 Aluminum and Aluminum-Alloy Bar, Rod, and Wire.

# 1.3 SUBMITTALS

A. A sample of all signs and posts to be placed shall be submitted to the Engineer for review prior to ordering.

# 1.4 QUALITY ASSURANCE

A. Material and equipment shall be the standard product of a manufacturer who has manufactured them for a minimum of 2-years and provides published data on quality and performance.

# 1.5 GUARANTEE

A. Contractor shall guarantee the quality of materials and workmanship for a period of 12-months after acceptance. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

#### 1.6 MEASUREMENT AND PAYMENT

A. No separate measurement will be made for Traffic Signs. Traffic Signs will be paid for in the lump sum contract.

## PART 2 – PRODUCTS

#### 2.1 UNIFORMITY

A. All signs shall be uniform in shape, color, dimensions, legends, and illumination or reflectorization.

#### 2.2 MATERIALS AND WORKMANSHIP

- A. Signs: Shall be aluminum 0.08-inch minimum thickness and shall conform to ASTM B 209, Alloy 6061-T6 or 5053-H38. Finished sign shall be clear cut, the lines of all letters and details true, regular and free from waviness, unevenness, furry edges, or lines and shall be free from all scaling, cracking, blistering, pitting, dents, or blemishes of any kind.
- B. Signposts: Shall be galvanized steel flanged "U" channel section with a minimum (before punching or drilling) of two (2) pounds per foot and shall conform to the minimum yield point and tensile strength specified in ASTM A 615 Grade 60. Galvanizing shall be in accordance with ASTM A 123. Length as specified on the plans. Holes may be punched or drilled 3/8-inch in diameter and spaced 1-inch center to center beginning 1-inch from the top and extending the full length of post.
- C. Hardware: Bolts shall be 5/16-inch diameter with hexagonal heads and of sufficient length to extend at least ¼-inch beyond the nut when installed. Nuts shall be hex nuts of the self-locking plastic insert type. The thread fit for nuts shall be ANSI, Class 2B. The washers shall be flat and 25/64-inch ID by ¾-inch OD by 0.091 inch thick. These washers are to be placed between head of bolt and sign face. Bolts, nuts, washers, and spacers may be aluminum, stainless steel or galvanized steel. Galvanized steel bolts and washers shall conform to ASTM A 307, galvanized in accordance with ASTM A 153. Aluminum shall conform to ASTM B 211, Alloy 2024-T4 for bolts, Alloy 2017-T4 for nuts, and ASTM B 209, Alloy 2024-T4 for washers. Stainless steel shall conform to ASTM A 193, Type B8.

#### 2.3 PRODUCT REVIEW

A. Contractor shall provide the Engineer with a complete description of all products before ordering. The Engineer will review all products before they are ordered.

#### PART 3 – EXECUTION

#### 3.1 GENERAL

A. Signposts and their foundations and sign mountings shall be constructed to hold signs in a proper and permanent position, to resist swaying in the wind or displacement by vandalism.

#### 3.2 LOCATION

A. Signs are to be placed as shown on the plans. Signs shall conform to height and lateral locations as shown in the Manual on Uniform Traffic Control Devices.

## 3.3 ERECTION

A. Drive type posts may either be driven in place or placed in prepared holes. Driven posts will be limited to locations where the surrounding soil is firm and stable. When sandy or unstable soils are present, each drive post shall be placed in a prepared dry hole minimum 6-inches in diameter. Whenever posts are placed in prepared holes, the holes shall be backfilled with a mixture of Portland Cement and sand. The resultant mixture shall be mixed with water to a moist consistency and placed around posts. All posts shall be erected in a vertical and plumb position to a depth of 3-feet and at an angle to the roadway as shown on plans or directed by Engineer.

END OF SECTION

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#### SECTION 10 21 13.19 - PLASTIC TOILET COMPARTMENTS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

#### A. Section Includes:

1. Solid-plastic toilet compartments configured as toilet enclosures and urinal screens.

## B. Related Requirements:

- 1. Section 09 22 16 "Non-Structural Metal Framing" for blocking.
- 2. Section 10 28 00 "Toilet, Bath, and Laundry Accessories" for accessories mounted on toilet compartments.

## 1.3 COORDINATION

A. Coordinate requirements for blocking, reinforcing, and other supports concealed within wall.

#### 1.4 ACTION SUBMITTALS

#### A. Product Data:

- 1. Solid-plastic toilet compartments:
  - a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.
- B. Shop Drawings: For solid-plastic toilet compartments.
  - 1. Include plans, elevations, sections, details, and attachment details.
  - 2. Show locations of cutouts for compartment-mounted toilet accessories.
  - 3. Show locations of centerlines of toilet fixtures.
  - 4. Show locations of floor drains.
- C. Samples for Verification: Actual sample of finished products for each type of toilet compartment indicated.
  - 1. Size: Manufacturers? standard size.
  - 2. Include each type of hardware and accessory.

D. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

## 1.5 INFORMATIONAL SUBMITTALS

#### A. Certificates:

1. Product Certificates: For each type of toilet compartment by manufacturer.

#### 1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Extra Stock Material: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Door Hinges: One hinge(s) with associated fasteners.
  - 2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
  - 3. Door Bumper: One bumper(s) with associated fasteners.
  - 4. Door Pull: One door pull(s) with associated fasteners.
  - 5. Fasteners: 10 fasteners of each size and type.

## 1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements, and coordinate before fabrication.

#### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Fire Performance: Tested in accordance with, and pass the acceptance criteria of, NFPA 286.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Department of Justice "2010 ADA Standards for Accessible Design" and ICC A117.1

## 2.2 SOLID-PLASTIC TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. BASIS OF DESIGN: ASI Accurate Partitions.

- 2. Hadrian Manufacturing Inc.
- 3. Scranton Products.
- B. Toilet-Enclosure Style: Floor anchored.
- C. Urinal-Screen Style: Wall hung.
- D. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
  - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
  - 2. Heat-Sink Strip: Manufacturer's standard continuous, stainless steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
  - 3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.
- E. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.
- F. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe and sleeve (cap) matching that on the pilaster.
- G. Brackets (Fittings):
  - 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- H. Overhead Cross Bracing for Ceiling-Hung Units: As recommended by manufacturer and fabricated from solid polymer.

## 2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories, Heavy Duty: Manufacturer's heavy-duty operating hardware and accessories.
  - 1. Hinges: Manufacturer's minimum 0.062-inch-thick stainless steel continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door. Mount with through bolts.
  - 2. Latch and Keeper: Manufacturer's heavy-duty, surface-mounted, cast-stainless steel latch unit, designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through bolts.
  - 3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless steel hook and rubber-tipped bumper, sized to prevent inswinging door from hitting compartment-mounted accessories. Mount with through bolts.
  - 4. Door Bumper: Manufacturer's heavy-duty, rubber-tipped, cast-stainless steel bumper at outswinging doors. Mount with through bolts.
  - 5. Door Pull: Manufacturer's heavy-duty, cast-stainless steel pull at outswinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through bolts.

- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel compatible with related materials.

#### 2.4 MATERIALS

- A. Aluminum Castings: ASTM B26/B26M.
- B. Aluminum Extrusions: ASTM B221.
- C. Brass Castings: ASTM B584.
- D. Brass Extrusions: ASTM B455.
- E. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- F. Stainless Steel Castings: ASTM A743/A743M.
- G. Zamac: ASTM B86, commercial zinc-alloy die castings.

#### 2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- D. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for connection to structural support above finished ceiling. Provide assemblies that support pilasters from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.
- E. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.

- F. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.
- G. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, inswinging doors for standard toilet compartments and 36-inch-wide, outswinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

#### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
  - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION OF PLASTIC TOILET COMPARTMENTS

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
  - 1. Maximum Clearances:
    - a. Pilasters and Panels: 1/2 inch.
    - b. Panels and Walls: 1 inch.
  - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
    - a. Locate wall brackets, so holes for wall anchors occur in masonry or tile joints.
    - b. Align brackets at pilasters with brackets at walls.
  - 3. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
    - a. Locate bracket fasteners, so holes for wall anchors occur in masonry or tile joints.
    - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels and adjust, so tops of doors are parallel with overhead brace when doors are in closed position.

- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust, so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust, so bottoms of doors are level with bottoms of pilasters when doors are in closed position.
- E. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust, so doors are level and aligned with panels, when doors are in closed position.
- F. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

#### 3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out swinging doors to return doors to fully closed position.

END OF SECTION 10 21 13.19

## SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

#### PART 1 - GENERAL

#### 1.1 SUMMARY

#### A. Section Includes:

- 1. Public-use washroom accessories.
- 2. Public-use shower room accessories.
- 3. Childcare accessories.
- 4. Underlayatory guards.
- 5. Custodial accessories.

## 1.2 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Include electrical characteristics.
- B. Samples: For each exposed product and for each finish specified, full size.
  - 1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
  - 1. Identify locations using room designations indicated.
  - 2. Identify accessories using designations indicated.
- D. Delegated Design Submittal: For grab bars and shower seats.
  - 1. Include structural design calculations indicating compliance with specified structural-performance requirements.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

#### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

#### 1.6 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, visible silver spoilage defects.
  - 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Toilet-Compartment Occupancy-Indicator Systems: Manufacturer agrees to repair or replace toilet-compartment occupancy-indicator systems that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Manufacturer's Special Warranty for Hand Dryers: Manufacturer agrees to repair or replace hand dryers that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

#### PART 2 - PRODUCTS

## 2.1 OWNER – FURNISHED MATERIALS

- A. Owner-Furnished Materials
  - 1. SD-1 Automatic Soap Dispenser: Spartan. Lite N Foamy.
  - 2. TD-1 Toilet Tissue Dispenser (Wall Mount): Georgia Pacific Pro. Compact.
  - 3. TD-2 Toilet Tissue Dispenser (Partition Mounted): Georgia Pacific Pro. Compact.
  - 4. PT-1 Paper Towel Dispenser: Georgia Pacific Pro. Pacific Blue Ultra.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Structural Performance: Design accessories and fasteners to comply with the following requirements:

- 1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
- 2. Shower Seats: Installed units are able to resist 360 lbf applied in any direction and at any point.

#### 2.3 PUBLIC-USE WASHROOM ACCESSORIES

- A. Source Limitations: Obtain each type of public-use washroom accessory from single source from single manufacturer.
- B. Waste Receptacle: WR-1
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. American Specialties, Inc. (ASI).
    - b. Bobrick Washroom Equipment, Inc.
    - c. <u>Bradley Corporation</u>.
  - 2. Mounting: Surface mounted.
  - 3. Minimum Waste-Receptacle Capacity: 16.5 gal..
  - 4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
  - 5. Liner: Reusable, vinyl waste-receptacle liner.
  - 6. Lockset: Tumbler type for waste receptacle.
- C. Grab Bar (GB-1, 2, 3, & 4):
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. American Specialties, Inc. (ASI).
    - b. Bobrick Washroom Equipment, Inc.
    - c. <u>Bradley Corporation</u>.
  - 2. Mounting: Flanges with concealed fasteners.
  - 3. Material: Stainless steel, 0.05 inch thick.
    - a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).
  - 4. Outside Diameter: 1-1/4 inches.
  - 5. Configuration and Length: As indicated on Drawings.
- D. Sanitary-Napkin and Tampon Vendor (SD-3):
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. <u>American Specialties, Inc. (ASI)</u>.
    - b. <u>Bobrick Washroom Equipment, Inc.</u>
    - c. <u>Bradley Corporation</u>.

- 2. Mounting: Surface mounted.
- 3. Operation: Single coin (25 cents).
- 4. Exposed Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- 5. Lockset: Tumbler type with separate lock and key for coin box.

## E. Sanitary-Napkin Disposal Unit (SD-1):

- 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
  - a. American Specialties, Inc. (ASI).
  - b. <u>Bobrick Washroom Equipment, Inc.</u>
  - c. <u>Bradley Corporation</u>.
- 2. Mounting: Partition mounted, dual access Surface mounted.
- 3. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
- 4. Receptacle: Removable.
- 5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

## F. Mirror Unit (MG-1):

- 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
  - a. American Specialties, Inc. (ASI).
  - b. Bobrick Washroom Equipment, Inc.
  - c. Bradley Corporation.
- 2. Frame: Stainless steel angle, 0.05 inch thick.
  - a. Corners: Manufacturer's standard.
- 3. Size: As indicated on Drawings.
- 4. Hangers: Manufacturer's standard rigid, tamper and theft resistant.

## 2.4 PUBLIC-USE SHOWER ROOM ACCESSORIES

- A. Source Limitations: Obtain public-use shower room accessories from single source from single manufacturer.
- B. Shower Curtain Rod (SR-1):
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. American Specialties, Inc. (ASI).
    - b. <u>Bobrick Washroom Equipment, Inc.</u>
    - c. <u>Bradley Corporation</u>.
  - 2. Description: 1-inch- outside diameter, straight rod.
  - 3. Configuration: As indicated on Drawings

- 4. Mounting Flanges: Exposed fasteners; in material and finish matching rod.
- 5. Rod Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

## C. Shower Curtain: (SR-1)

- 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
  - a. American Specialties, Inc. (ASI).
  - b. <u>Bobrick Washroom Equipment, Inc.</u>
  - c. Bradley Corporation.
- 2. Size: Minimum 12 inches wider than opening by 72 inches high.
- 3. Material: Vinyl, minimum 0.006 inch thick, opaque, matte.
- 4. Color: As selected from manufacturer's full range.
- 5. Grommets: Corrosion resistant at minimum 6 inches o.c. through top hem.
- 6. Shower Curtain Hooks: Chrome-plated or stainless steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

## D. Folding Shower Seat: (SS-1)

- 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
  - a. American Specialties, Inc. (ASI).
  - b. Bobrick Washroom Equipment, Inc.
  - c. Bradley Corporation.
- 2. Configuration: L-shaped seat, designed for wheelchair access.
- 3. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect.
- 4. Mounting Mechanism: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- 5. Dimensions: Refer to enlarged bathroom plans.

## E. Robe Hook: (RH-1)

- 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
  - a. <u>American Specialties, Inc. (ASI)</u>.
  - b. Bobrick Washroom Equipment, Inc.
  - c. Bradley Corporation.
- 2. Description: Double-prong unit.
- 3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- 4. Mounting: Exposed

## 2.5 CHILDCARE ACCESSORIES

- A. Source Limitations: Obtain childcare accessories from single source from single manufacturer.
- B. Diaper-Changing Station (BC-1):
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. American Specialties, Inc. (ASI).
    - b. Bradley Corporation.
    - c. Basis of Design: Koala Kare Products; a Division of Bobrick.
  - 2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
    - a. Engineered to support minimum of 250-lb static load when opened.
  - 3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
  - 4. Operation: By pneumatic shock-absorbing mechanism.
  - 5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin), with replaceable insulated polystyrene tray liner and rounded plastic corners.
  - 6. Liner Dispenser: Provide built-in dispenser for disposable sanitary liners.

## 2.6 UNDERLAVATORY GUARDS

- A. Underlayatory Guard:
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
    - a. Buckaroos, Inc.
    - b. Plumberex Specialty Products, Inc.
    - c. Truebro by IPS Corporation.
  - 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
  - 3. Material and Finish: Antimicrobial, molded plastic, white.

### 2.7 CUSTODIAL ACCESSORIES

- A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.
- B. Custodial Utility Shelf: (CS-1)
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:

- a. American Specialties, Inc. (ASI).
- b. Bobrick Washroom Equipment, Inc.
- c. <u>Bradley Corporation</u>.
- 2. Description: With exposed edges turned down not less than 1/2 inch and supported by two triangular brackets welded to shelf underside.
- 3. Size: 16 inches long by 6 inches deep.
- 4. Material and Finish: Not less than nominal 0.05-inch-thick stainless steel, ASTM A480/A480M No. 4 finish (satin).

## C. Custodial Mop and Broom Holder: (CS-2)

- 1. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
  - a. American Specialties, Inc. (ASI).
  - b. Bobrick Washroom Equipment, Inc.
  - c. <u>Bradley Corporation</u>.
- 2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
- 3. Length: 36 inches.
- 4. Hooks: Four.
- 5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
- 6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
  - a. Shelf: Not less than nominal 0.05-inch-thick stainless steel.
  - b. Rod: Approximately 1/4-inch-diameter stainless steel.

## 2.8 MATERIALS

- A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch-minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.
- C. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch-minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.
- G. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

## 2.9 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
  - 1. Remove temporary labels and protective coatings.
- B. Grab Bars: Install to comply with specified structural-performance requirements.
- C. Shower Seats: Install to comply with specified structural-performance requirements.

#### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 10 28 00

#### SECTION 10 44 13 - FIRE PROTECTION CABINETS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Fire-protection cabinets for portable fire extinguishers.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fire-protection cabinets.
- C. Samples: For each type of exposed finish required.

## 1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

#### 1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

#### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

## 2.2 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:

- a. Activar Construction Products Group, Inc. JL Industries.
- b. Babcock-Davis.
- c. Fire-End & Croker Corporation.
- d. Guardian Fire Equipment, Inc.
- e. Larsens Manufacturing Company.
- f. Modern Metal Products, Division of Technico Inc.
- g. MOON American.
- h. Nystrom.
- i. Potter Roemer LLC; a Division of Morris Group International.
- j. Strike First Corporation of America (The).
- B. Cabinet Construction: Nonrated.
  - 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch-thick cold-rolled steel sheet lined with minimum 5/8-inch-thick fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Cold-rolled steel sheet.
- D. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim.
- E. Cabinet Trim Material: Steel sheet.
- F. Door Material: Steel sheet.
- G. Door Style: Fully glazed panel with frame.
- H. Door Glazing: Tempered float glass (clear).
  - 1. Acrylic Sheet Color:
  - 2. Clear transparent acrylic sheet.
  - 3. Clear transparent acrylic sheet painted red on unexposed side.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- J. Accessories:
  - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
  - 2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
  - 3. Break-Glass Door Handle: Manufacturer's standard, integral to glass with the words "PULL TO BREAK GLASS" applied to handle.
  - 4. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
  - 5. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.

- 6. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
  - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
    - 1) Location: Applied to cabinet glazing.
    - 2) Application Process: Silk-screened.
    - 3) Lettering Color: White.
    - 4) Orientation: Vertical.
- 7. Alarm: Manufacturer's standard alarm that actuates when fire-protection cabinet door is opened and that is powered by batteries.

## K. Materials:

- 1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.
  - a. Finish: Factory primed for field painting.
  - b. Color: As selected by Architect from manufacturer's full range.
- 2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

## 2.3 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

## PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- C. Identification: Apply decals at locations indicated.
- D. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

## END OF SECTION 10 44 13

#### SECTION 10 44 16 - FIRE EXTINGUISHERS

#### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

## 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

#### 1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

#### 1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

#### 1.5 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

## 1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Six years from date of Substantial Completion.

#### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

## 2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Activar Construction Products Group, Inc. JL Industries.
    - b. Amerex Corporation.
    - c. Ansul; brand of Johnson Controls International plc, Building Solutions North America.
    - d. Babcock-Davis.
    - e. Badger Fire Protection.
    - f. Buckeye Fire Equipment Company.
    - g. Fire End & Croker Corporation.
    - h. Guardian Fire Equipment, Inc.
    - i. <u>Kidde; Carrier Global Corporation</u>.
    - j. Larsens Manufacturing Company.
    - k. MOON American.
    - 1. Nystrom.
    - m. Potter Roemer LLC; a Division of Morris Group International.
    - n. <u>Pyro-Chem; brand of Johnson Controls International plc, Building Solutions North America.</u>
    - o. Strike First Corporation of America (The).
  - 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type: UL-rated 4A:80B:C nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

## 2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red black baked-enamel finish.
  - 1. <u>Manufacturers:</u> Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
    - a. Activar Construction Products Group, Inc. JL Industries.
    - b. Amerex Corporation.
    - c. <u>Ansul; brand of Johnson Controls International plc, Building Solutions North</u> America.
    - d. <u>Babcock-Davis</u>.

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- e. Badger Fire Protection.
- f. Buckeye Fire Equipment Company.
- g. Fire End & Croker Corporation.
- h. Guardian Fire Equipment, Inc.
- i. Kidde; Carrier Global Corporation.
- j. <u>Larsens Manufacturing Company</u>.
- k. Nystrom.
- 1. Potter Roemer LLC; a Division of Morris Group International.
- m. <u>Pyro-Chem; brand of Johnson Controls International plc, Building Solutions North</u> America.
- n. <u>Strike First Corporation of America (The)</u>.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
  - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
    - a. Orientation: Vertical.

#### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
  - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
  - 1. Mounting Brackets: Top of fire extinguisher to be at 42 inches above finished floor.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 44 16

#### SECTION 10 51 29 - CUSTOM PHENOLIC LOCKERS

#### PART 1 - GENERAL

#### 1.1 WORK INCLUDED

- A. Phenolic Lockers.
- B. Phenolic Locker Benches.
- C. Bench Pedestals.
- D. Locker Hardware and Accessories.

## 1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Wall backing and floor support to anchor Lockers and Bench Pedestals.

## 1.3 REFERENCES

- A. American Society for Testing and Materials:
  - 1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Material
  - 2. ASTM D6578 Standard Practice for Determination of Graffiti Resistance
  - 3. ASTM D1037 Direct Screw Withdrawal Test
  - 4. ASTM D570 Standard Test Method for Water Absorption
  - 5. ASTM A167, 18-8, Type 304 Cast Stainless Steel
- B. National Fire Protection Association (NFPA).
- C. UBC *Requirements for Handicapped*.
- D. I CC A 117. 1 ADA, Accessibility Guidelines for Buildings and Facilities.
- E. 2005 LD-3 NEMA Standard Test, Chemical Resistance, Modulus of Elasticity, Shear Strength and Compression Strength.

## 1.4 QUALITY STANDARDS AND KEY DESIGN CHARACTERISTICS

- A. Flame Spread: When tested in accordance with ASTM E84, Lockers and Bench materials shall meet or exceed all requirements for Class B Flame Spread Rating and Smoke Developed and shall carry a Class B Fire Rating Certification in accordance with the requirements of NFPA and ICC. Class B Fire Rating Certification shall be in the name of the Locker Manufacturer and shall be less than six (6) months old.- (Class A Fire Rating Available)
  - 1. Flame Spread shall not exceed 75.
  - 2. Smoke Developed shall not exceed 450.Frameless Locker Doors: Locker Doors on tier lockers shall be the full width of the Locker Body and shall be frameless, allowing access to the entire width of the Locker. Framed Doors are unacceptable. Perimeter ventilation shall provide superior ventilation properties to traditional framed doors.

- B. Locker Body: The locker body shall incorporate mortise and tenon construction and shall be mechanically fastened with stainless steel fasteners. Shelves shall be mortised into side walls of body and shall be secured with stainless steel fasteners. Locker body shall incorporate box locker construction to allow for multiple locker configurations within the same locker body shall be white in color.
- C. Graffiti Resistance Requirements: When tested in accordance with ASTM D6578, Locker materials shall prove resistant to all chemicals tested for a period of 1 to 10 minutes and shall leave no mar or blemish on the surface when cleaned. Locker materials shall have guaranteed surface clean ability from permanent markers and shall have Non-Ghosting properties.
- D. Scratch Resistance Requirements: When tested in accordance with ASTM D2197, Locker materials shall prove to be scratch resistant when the maximum Load Value exceeds 10 kilograms.
- E. Impact Resistance Requirements: When tested in accordance with ASTM D2794, Locker materials shall withstand an Impact Force Value in excess of 45 inch-lbs.
- F. Screw Holding Strength: When tested in accordance with ASTM D1037, Direct Screw Withdrawal Test, Locker materials shall withstand a direct pull force that exceeds 2,500 lbs per fastener.
- G. Tensile/Shear/Compression Strength: Locker materials shall have a Modulus of Elasticity of 1.55 Million PSI. Locker materials shall have a Shear Strength of 2,000 PSI minimum and a Compression Strength of 24,000 PSI minimum.
- H. Water Absorption Requirements: When tested in accordance with ASTM D570 Locker materials shall have a Water Absorption Rate of less than 0.37%.

#### 1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's detailed technical data for materials, fabrication, and installation, including catalog cuts of anchors, hardware, fasteners, and accessories in accordance with Section 01330 Submittal Procedures.
- B. Shop Drawings: Furnish Shop Drawings (project specific) in quantities requested for fabrication and installation of solid phenolic lockers and benches. Include plans, elevations, sections, numbering, colors, details, and anchorages/ attachments to other work.
- C. Samples for Initial Selection:
  - 1. Submit manufacturer's color chart with manufacturer's full range of Standard Colors.
  - 2. Submit certification that materials furnished comply with requirements specified.
- D. Submit two (2) 6" square Samples of each color and finish for color verification after selections have been made (if requested).
- E. Maintenance Instructions: Provide manufacturer's printed Instructions for Cleaning and Maintenance of installed Work.
- F. Manufacturer's Written 25-year Warranty: Provide manufacturer's Written Warranty as detailed

herein.

#### 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating units without field measurements. Coordinate supports, adjacent construction, and wall openings to ensure actual dimensions correspond to Established Dimensions.

## 1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original packaging to protect from damage.
- B. Store materials in manufacturer's original packaging in accordance with manufacturer's instructions. Store Lockers indoors, protected from the elements and construction hazards.
- C. Handle materials in a manner that will protect the finished product.

#### 1.8 MANUFACTURER'S WARRANTY

A. Provide manufacturer's Twenty-five (25) year written limited warranty against breakage, corrosion, de-lamination and defects in workmanship of all Phenolic components; to be replaced without charge, excluding labor.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Solid Phenolic Lockers and Benches by RFS Sports. 375 Columbia Memorial Parkway, Kemah, TX 77565, 281-334-6800, Contact Derek Shoe- derek@teamrfs.com, www.teamrfs.com
  - 1. Other manufacturers may be submitted for evaluation shall be equivalent with these key features:
    - a. Morton and Tenon construction method
    - b. Uni-Body assembly of locker
    - c. Frameless construction
    - d. Solid Phenolic
  - 2. All bids shall be based on the standard of quality established herein.

## 2.2 LOCKER UNIT CONFIGURATION AND SIZE OPTIONS: Barnwell High School

A. Locker Types: Contact Derek Shoe, derek@teamrfs.com

LKR 01 - IMPACT Athletic Phenolic Locker

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Model: LS - Lockbox, Flip Seat, Ventilated Footlocker Color: Standard

Wilsonart/Formica

Size: 24" W x 24" D x 72"H/ Overall Height 74"-76" w/ adjustable legs & toe kick and 18" W x 24" D x 72" H / Overall Height 74" -76" w/ adj. legs and toe kick

Style: Curved Sides

Equipment: J Hooks, Name Plate Holder Lock: Ojmar Padlock Hasp Logo: Emblem- 2 Layer Acrylic

#### 2.3 MATERIALS

A. Material shall be Solid Phenolic with a High-Pressure Melamine matte finish surface made as an integral part of the core material. Laminated surfaces are not acceptable. Surface and edges shall be non-porous and shall not support fungus or bacteria. Provide material which has been selected for uniform color, surface flatness and smoothness. Exposed surfaces which exhibit discolorations, pitting, seam marks, roller marks, stains, telegraphing of core material, or other imperfections on finished units are not acceptable. Defects such as chipping along edges and corners are unacceptable.

#### B. Material Thicknesses:

- 1. Doors, Slope Tops, End Panels, and Toe Kick Plates Minimum .50" (13 mm) Finished Thickness
- 2. Locker Box, Tops, Bottoms, and Shelves Minimum .375" (10 mm) Finished Thickness. Sides and Locker Backs Minimum .3125" (8 mm)

  Finished Thickness.
- 3. Locker Pedestal Benches Minimum .75" (19 mm) Finished Thickness.
- 4. Locker Bench Tops Minimum .75" (19 mm) Finished Thickness.
- C. Colors: To be selected by Project Architect from standard Formica or Wilsonart.
- D. Team Locker Seating: if applicable
  - 1. Industrial Marine Grade Vinyl covered cushion with or without screen printed logo
- E. Slope Tops, End Panels, and Toe Kick Plates: Shall be manufactured of the same color, thickness and material as the Locker Doors.

#### 2.4 HARDWARE

- A. Locker Hinges: Hinges shall be concealed and shall be made of 14 Gauge Type 304 Stainless Steel and have a Satin finish. Hinge shall have five (5) knuckles and shall allow door to open 90°.
- B. Locks: A Hasp lock is standard and shall be fabricated of 11 Gauge Type 304 Stainless Steel with a Satin Finish. All edges shall be polished and smooth. Hasp shall be attached to the Locker Body with two (2) Stainless Steel Theft Proof Torx Head with Pin, Through Bolts. Hasp shall extend through a slot in the face of the Locker Door and the Locker Number Plate. Locker Hasp Bar is to be used with padlocks (padlocks are not included). Additional locks can be used and are the following (please call out):

<sup>\*</sup> Refer to Floor Plan for locations of each locker size.

- 1. Ojmar Combi
- 2. Ojmar OCS Pro Smart
- 3. Digilock CUE/Sola
- 4. Digilock Axis
- 5. Master Combo-dial
- C. Coat Hooks: Coat Hooks shall be fabricated of 11 Gauge Type 304 Stainless Steel with a Satin Finish. All edges shall be polished and smooth. Coat Hooks shall be attached to the Locker Body with Stainless Steel Theft Proof Torx Head with Pin fasteners or Through Bolts. Provide three (3) Coat Hooks for Single Tier Lockers and three (3) for Double Tier and "Z" Lockers. Plastic and aluminum Coat Hooks are unacceptable.
- D. Number Plates: Provide a Number Plate for each Door or opening, in the sequence as indicated on the drawings. Number Plate shall be engraved from the back side to prevent the accumulation of dirt and grime.
- E. Locker Legs: Provide Locker Legs for all Lockers except recessed and base mounted Lockers. Locker Leg assembly shall be structural and shall be fully adjustable to provide for leveling and plumbing of Locker Body. Provide Toe Kick Plates with all necessary hardware for attaching to the Locker Leg.
- F. Bench Pedestals: Provide all necessary Stainless-Steel fasteners to secure Bench Pedestal to the floor and Bench Top. *Select One* (1) of the following:
  - 1. Black Powder Coated Gauge Steel. Bench Pedestal shall be constructed of 11 Gauge Steel and shall be 16.5" High. Center post shall be load bearing and shall extend from the floor to the bottom of the Bench Top. Top and bottom flanges shall be heli-arch welded to center post and shall be 8" in diameter. Bench Pedestals shall be secured to floor with Stainless Steel Torx Head with Pin, #14 X 2" Screws.
  - 2. (Recommended) Stainless Steel. Bench Pedestal shall be constructed of 11 Gauge Type 304 Stainless Steel and shall be 16.5" High. Center post shall be load bearing and shall extend from the floor to the bottom of the Bench Top. Top and bottom flanges shall be welded to center post and shall be 8" in diameter. Bench Pedestals shall be secured to floor with Stainless Steel Torx Head with Pin, #14 X 2" Screws.
  - 3. Black Powder Coated Aluminum: Bench Pedestal shall be 16.5" High. Center post shall extend from the floor to the bottom of the Bench Top and shall be made of 2" square tubing. Top and bottom plates shall be 6" square and shall be .250" thick and shall be welded to 2" tubing. Bench Pedestals shall be secured to floor with Stainless Steel Torx Head with Pin, #14 X 2" Screws.
- G. Slope Top Mounting Channels and Supports: Slope Top Mounting Channels and Supports shall be made of Heavy Duty Extruded 6063-T5 Aluminum and shall have a (Satin Anodized) (Black Anodized) finish. Mounting Channels shall be field installed and shall attach to the front top edge of the Locker Body and shall be continuous across the front of the Lockers. Supports shall be universal and shall attach to any standard depth or width Locker via factory pre-drilled holes.

#### 2.5 FABRICATION

A. General: Provide factory pre-assembled Locker units. Lockers shall be complete with all hardware and accessories listed above. Knock down units are unacceptable.

B. Slope Tops and End Panels: Provide Slope Tops and End Panels as required to complete the installation of the Lockers.

## PART 3 - PART 3 - EXECUTION

#### 3.1 SITE INSPECTION

- A. Verify that field dimensions are in accordance with Locker Shop Drawings. Inspect walls to ensure that they are plumb and suitable for the installation of the Lockers.
- B. Check location of built-up bases, built in framing or blocking, and wall openings to ensure that they are in compliance with the approved Locker Shop Drawings.
- C. Have any inappropriate conditions corrected before beginning installation.

## 3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions. Install Lockers rigid, straight, plumb, and level.
- B. Through Bolt Locker Boxes together with Stainless Steel Theft Proof Torx Head with Pin, Through Bolts.
- C. Anchor Locker Boxes to the wall with provided anchor devices.
- D. Install Slope Tops, End Panels, Filler Strips and accessories in accordance with written instructions.

## 3.3 ADJUSTING AND CLEANING

- A. Hardware Adjustment: Adjust hardware according to manufacturer's written instructions for proper operation.
- B. Provide final protection and maintain conditions that ensure Lockers are without damage or deterioration at the time of substantial completion. Clean all exposed surfaces of Lockers and hardware.

END OF SECTION 10 51 29

## SECTION 11 66 23 - GYMNASIUM EQUIPMENT

#### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Basketball equipment.
  - 2. Volleyball equipment.

## 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For gymnasium equipment.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each item and color specified.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Court layout plans, reflected ceiling plans, and other details, drawn to scale, and coordinated with ceiling-suspended gymnasium equipment, floor inserts, game lines, and markers applied to finished flooring, and coordinated with each other, using input from installers of the items involved.
- B. Product Certificates: For each type of gymnasium equipment.
- C. Sample warranty.

#### 1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

## 1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

#### 1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of gymnasium equipment that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

#### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Basketball backstops and anchors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

## 2.2 BASKETBALL EQUIPMENT

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
  - 1. AALCO Manufacturing.
  - 2. Jaypro Sports, LLC.
  - 3. L. A. Steelcraft Products, Inc.
  - 4. Performance Sports Systems.
  - 5. Porter Athletic Equipment Company.
- B. Standard Rules: Provide equipment according to the requirements of NBA's "Official Rules of the National Basketball Association."
- C. Connections: Manufacturer's standard connections or connections recommended in writing by manufacturer and complying with Section 05 50 00 "Metal Fabrications" of size and type required to transfer loads to building structure.
- D. Portable Basketball System.
- E. Basketball Backboards:
  - 1. Shape and Size:
    - a. Rectangular, 72 by 42 inches width by height.
  - 2. Backboard Material: Provide with predrilled holes or preset inserts for mounting goals, and as follows:
    - a. Fiberglass: Minimum 1-1/2-inch-thick.
  - 3. Target Area and Border Markings: Marked in pattern, stripe width, and color according to referenced standard rules.
  - 4. Finish: Manufacturer's standard factory-applied, white background.

- F. Goal-Mounting Assembly: Compatible with goal, backboard, and backstop.
- G. Basketball Goals: Basket ring complete with flanges, braces, attachment plate, and evenly spaced loops welded around underside of ring.
  - 1. Double-rim basket ring.
  - 2. Type:
    - Movable: pressure-release design with manufacturer's standard breakaway mechanism and rebound characteristics identical to those of fixed, nonmovable ring.
  - 3. Finish: Manufacturer's standard finish.
- H. Basketball Nets: 12-loop-mesh net, between 15 and 18 inches long, sized to fit ring diameter, and as follows:
  - 1. Cord: Made from white nylon.
- I. Backboard Safety Pads: Designed for backboard thickness and extending continuously along bottom and up sides of backboard and over backstop as required by referenced standard rules.
  - 1. Color: As selected by Architect from manufacturer's full range.

## 2.3 VOLLEYBALL EQUIPMENT

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to:
  - 1. AALCO Manufacturing.
  - 2. Jaypro Sports, LLC.
  - 3. L. A. Steelcraft Products, Inc.
  - 4. Performance Sports Systems.
  - 5. Porter Athletic Equipment Company.
- B. Standard Rules: Provide equipment according to the requirements of FIVB's "Official Volleyball Rules".
- C. Floor Insert: Solid-brass floor plate and steel pipe sleeve, concealed by floor plate, with capped bottom end, sized with ID to fit post standards, minimum length required, to securely anchor pipe sleeve below finished floor in concrete footing; with anchors designed for securing floor insert to floor substrate indicated; one per post standard.
  - 1. Flush Floor Plate: Self-locking, Manufacturer's standard hinged access cover, designed to be flush with adjacent flooring. Provide one tool(s) for unlocking access covers.
- D. Post Standards: Removable, fixed-height paired volleyball post standards, as indicated on Drawings, designed for easy removal from permanently placed floor inserts.
  - 1. Materials: Steel pipe or tubing, with nonmarking plastic or rubber end cap or floor bumper to protect permanent flooring.

- 2. Nominal Pipe or Tubing Diameter: 3-inch OD at base.
- 3. Finish: Manufacturer's standard factory-applied, polyester powder-coat finish.
- 4. Net Height Adjuster: Manufacturer's standard mechanism for height adjustment, complete with fittings; designed for positioning net at heights indicated.
  - a. Net Heights: For ages 12 and under net height and boys'/men's volleyball net height, 84 and 95-5/8 inches or more.
- 5. Height Markers: Clearly marked at regulation play heights for girls/women; boys/men.
- E. Net: 32 feet long; one per pair of paired post standards; and as follows:
  - 1. Width and Nylon Mesh: Competition volleyball net, 39 inches with 4-inch-square knotless mesh made of black nylon string.
  - 2. Dowels: Minimum 1/2-inch-diameter fiberglass or 1-inch-diameter wood. Provide two dowels per net threaded through each side hem sleeve for straightening net side edges.
  - 3. Net Antennas: 3/8-inch-diameter, high-tensile-strength, extruded-fiberglass or plastic rods, 72 inches long, extending above top hem band of net, with alternating white and red bands according to referenced standard rules. Provide two antennas per net.
  - 4. Boundary Tape Markers: 2-inch-wide white strip with sleeve for securing net antenna, secured to net top and bottom with hook-and-loop attachment. Provide two tape markers per net for marking court boundaries.
- F. Net-Tensioning System: Designed to adjust and hold tension of net. Fully enclosed, nonslip, manufacturer's standard-type winch with cable length and fittings for connecting to net lines, positive-release mechanism, and manufacturer's standard handle.
- G. Bottom Net Lock Tightener: Manufacturer's standard.
- H. Judges' Stands: Manufacturer's standard adjustable-height units designed to be freestanding, folding for storage with wheels for transporting.
- I. Safety Pads: Consisting of minimum 1-inch- thick, multiple-impact-resistant manufacturer's standard foam filler covered by puncture- and tear-resistant fabric cover, manufacturer's standard; with fire-test-response characteristics indicated, and lined with fire-retardant liner. Provide pads with hook-and-loop closure or attachments for the following components:
  - 1. Post Standards: Wraparound style pads, designed to totally enclose each standard to a minimum height of 72 inches; one per post.
  - 2. Net Lines: Four per net.
  - 3. Judges' Stands: Pads designed to totally enclose front and sides.
  - 4. Fabric Cover Flame-Resistance Ratings: Complies with NFPA 701.
  - 5. Fabric Color: As selected by Architect from full range of industry standard colors and color densities.
- J. Post Standard Transporter: Manufacturer's standard.
- K. Wall Storage Rack: Manufacturer's standard.
- L. Storage Cart: Manufacturer's standard.

## 2.4 MATERIALS

- A. Support Cable: Manufacturer's standard galvanized-stranded-steel wire rope. Provide fittings according to the wire rope manufacturer's written instructions for size, number, and installation method.
- B. Support Chain and Fittings: For chains used for overhead lifting, provide Grade 80 heat-treated alloy-steel chains, according to ASTM A391/A391M, with commercial-quality, hot-dip galvanized steel connectors and hangars.
- C. General-Purpose Chain: For chains not used for overhead lifting, provide carbon steel chain, according to ASTM A413/A413M (Grade 30 proof coil chain or higher grade recommended by gymnasium equipment manufacturer). Provide coating type, chain size, number, and installation method according to manufacturer's written instructions.
- D. Castings and Hangers: Malleable iron, according to ASTM A47/A47M; grade as required for structural loading.
- E. Equipment-Mounting Board: Wood, transparent finish; size and quantity as required to mount gymnasium equipment according to manufacturer's written instructions.
- F. Anchors, Fasteners, Fittings, and Hardware: Gymnasium equipment manufacturer's standard corrosion-resistant or noncorrodible units; concealed; tamperproof, vandal- and theft-resistant design.
- G. Grout: Nonshrink, nonmetallic, premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout, according to ASTM C1107/C1107M, with minimum strength recommended in writing by gymnasium-equipment manufacturer.

#### PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions and competition rules for each type of gymnasium equipment.
- B. Permanently Placed Gymnasium Equipment and Components: Install rigid, level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated; in proper relationship to adjacent construction; and aligned with court layout.
- C. Connections: Connect electric operators to building electrical system.
- D. Removable Gymnasium-Equipment Components: Assemble in place to verify that equipment and components are complete and in proper working order. Disassemble removable gymnasium equipment after assembled configuration is approved by Architect, and store units in location indicated on Drawings.
- E. Adjust movable components of gymnasium equipment to operate safely, smoothly, easily, and quietly; free from binding, warp, distortion, nonalignment, misplacement, disruption, or

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malfunction, throughout entire operational range; and lubricate as recommended in writing by manufacturer.

#### 3.2 **DEMONSTRATION**

A. Train Owner's maintenance personnel to adjust, operate, and maintain gymnasium equipment.

END OF SECTION 11 66 23

#### SECTION 11 66 53 - GYMNASIUM DIVIDERS

#### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section Includes:
  - 1. Roll-up divider systems.
  - 2. Electric operators.
  - 3. Divider curtains.
  - 4. Divider system accessories.

## 1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at project site.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.
- B. Shop Drawings: For gymnasium dividers.
  - 1. Include plans showing alignment of curtains in relation to sport-court layout and overhead structural supports.
  - 2. Include elevations, sections, details, and attachments to other work.
  - 3. Include system clearances, stacking requirements, and limits for fitting into adjacent construction.
  - 4. Include point loads and locations for attachment of gymnasium dividers to structure.
  - 5. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each item and color specified.
- D. Samples for Initial Selection: For each type of gymnasium divider curtain fabric.
- E. Samples for Verification: For divider curtain fabrics, not less than 6 inches square of mesh and of solid fabric.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans with divider-curtain layouts, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
  - 1. Structural members to which divider-curtain systems will be attached.
  - 2. Suspended ceiling components, if any.
  - 3. Items supported from building structure, including the following:
    - a. Lighting fixtures.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.
- B. Qualification Data: For Installer.
- C. Product Certificates: For each type of gymnasium divider.
- D. Sample Warranty: For special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For gymnasium dividers to include in operation and maintenance manuals.

## 1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of gymnasium dividers that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Faulty operation of gymnasium dividers.
    - b. Tearing or deterioration of fabric, seams, or other materials beyond normal use.
  - 2. Warranty Period: Two years from date of Substantial Completion.

### PART 2 - PRODUCTS

## 2.1 ROLL-UP DIVIDER SYSTEMS

- A. <u>Manufacturers:</u> Subject to compliance with requirements, provide products by one of the following:
  - 1. Draper Inc.
  - 2. <u>Spalding</u>.
  - 3. <u>Jaypro Sports, LLC.</u>
- B. Source Limitations: Obtain from single source from single manufacturer.
- C. Divider-Curtain System: Electrically operated with roll-up drive pipe, and as follows:
  - 1. Top Hem: Double-thickness mesh or solid vinyl for continuous pipe batten.
  - 2. Outer Edge Hems: Double turned
  - 3. Belts: 5-inch-wide polyester or polyurethane webbing or fabric belts, attached to top batten, passing under bottom batten and terminating at drive pipe, with friction surface on one side of belt or other means of drawing up curtain by rolling at bottom batten.
  - 4. Support Chain and Fittings: Hardened alloy-steel chain rated for lifting loads indicated, with commercial-quality, corrosion-resistant steel connectors and hangers.
  - 5. Curtain Battens and Drive Pipe: Fabricate from steel pipe or tubing with a minimum number of joints, as necessary for required lengths. Provide galvanized battens, or shop prime and shop finish with black paint.
    - a. Drive Pipe: 2-3/8-inch-nominal diameter steel pipe.
    - b. Top Batten: 1-1/2-inch-nominal diameter steel pipe.
    - c. Bottom Batten: 3-1/2-inch-nominal diameter steel pipe.

## 2.2 ELECTRIC OPERATORS

- A. Provide factory-assembled electric operation system of size and capacity recommended in writing and provided by gymnasium divider manufacturer for gymnasium dividers specified, with electric motors and factory-prewired motor controls, control devices, and accessories required for proper operation.
  - 1. Include wiring from control stations to motors and between synchronizer and dual motors for long curtains. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
- B. Electrical Components, Devices, and Accessories: Listed and labeled according to NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Motor Electrical Characteristics:
  - 1. Horsepower: 3/4 hp.
  - 2. Voltage: 110-120 V, single phase, 60 hertz.

D. Limit Switches: Adjustable switches at each divider curtain, interlocked with motor controls and set to automatically stop divider curtain at fully extended and fully retracted positions.

# E. Control System:

- 1. Key-Switch Operation: NEMA ICS 6, Type 1 enclosure, momentary-contact, three-position switch-operated control with up, down, and off functions.
  - a. Group Key-Switch Control: One switch per curtain.
  - b. Switches, Ganged: Single faceplate with multiple switch cutouts as indicated on Drawings.
  - c. Keys: Provide two keys per station.

## 2.3 DIVIDER CURTAINS

- A. Upper Curtain, Mesh: Woven mesh of polyester yarn coated with vinyl, weighing not less than 9 oz./sq. yd.
  - 1. Mesh Color: Architect from full range of manufactures standard colors.
- B. Lower Curtain, Solid: Woven polyester fabric coated with vinyl, 18 oz./sq. yd., 8-foot height above floor.
  - 1. Fabric Color: Selected by Architect from manufactures standard colors.
- C. Hems: Folded and electronically welded.
- D. Seams: Electronically welded.
- E. Overall Curtain Height: Floor to ceiling, within installation clearances required.
- F. Bottom of Curtain: Approximately 2 inches above finished floor.
- G. Divider-Curtain Flame-Resistance Rating: Passes NFPA 101 Test.

#### 2.4 SUPPORT MATERIALS AND FASTENERS

- A. Support Chain and Fittings: For chains used for overhead lifting, provide Grade 80, heat-treated alloy-steel chains, according to ASTM A391/A391M, with commercial-quality, steel connectors and hangers.
- B. General-Purpose Chain: For chains not used for overhead lifting, provide carbon steel chain, according to ASTM A413/A413M, Grade 30 proof coil chain or higher grade recommended by gymnasium divider manufacturer. Provide coating type, chain size, number, and installation method according to manufacturer's written instructions.

### PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for alignment of mounting substrates, installation tolerances, operational clearances, and other conditions affecting performance of the Work.
  - 1. Verify critical dimensions.
  - 2. Examine supporting structure.
  - 3. Examine wall assemblies, where reinforced to receive anchors and fasteners, to verify that locations of concealed reinforcements are clearly marked. Locate reinforcements and mark locations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions.
- B. Install gymnasium dividers after other finishing operations, including painting, have been completed unless otherwise indicated.
- C. Install gymnasium dividers level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated; in proper relation to adjacent construction; and aligned with sport-court layout.
  - 1. Verify clearances for movable components of gymnasium dividers throughout entire range of operation and for access to operating components.

### 3.3 ADJUSTING

Adjust movable components of gymnasium dividers to operate safely, smoothly, easily, and quietly, free from binding, warp, distortion, uneven tension, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range; and lubricate as recommended in writing by manufacturer. Retain "Limit Switch Adjustment" Paragraph below for electrically operated dividers.

### 3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain gymnasium dividers.

#### **END OF SECTION**

### SECTION 12 32 16 - MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

### PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

- 1. Plastic-laminate-clad casework.
- 2. Casework hardware and accessories.

# B. Related Requirements:

- 1. Section 06 10 00 "Rough Carpentry" for wood blocking for anchoring casework.
- 2. Section 09 22 16 "Non-Structural Metal Framing" for reinforcements in metal-framed partitions for anchoring casework.
- 3. Section 09 65 13 "Resilient Base and Accessories" for resilient base applied to plastic-laminate-clad casework.
- 4. Section 12 36 23.13 "Plastic-Laminate-Clad Countertops."

### 1.2 DEFINITIONS

A. Definitions in the AWI/AWMAC/WI's "Architectural Woodwork Standards" apply to the Work of this Section.

#### 1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that casework can be supported and installed as indicated.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For plastic-laminate-clad casework.
  - 1. Include plans, elevations, sections, and attachments to other work including blocking and reinforcements required for installation.
  - 2. Indicate types and sizes of casework.
  - 3. Indicate manufacturer's catalog numbers for casework.
  - 4. Show fabrication details, including types and locations of hardware.
  - 5. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and equipment.
  - 6. Apply AWI's Quality Certification Program label to Shop Drawings.

- C. Keying Schedule: Include schematic keying diagram, and index each key set to unique designations that are coordinated with the Contract Documents.
- D. Samples: For casework and hardware finishes.
- E. Samples for Initial Selection: For casework and hardware finishes.
- F. Samples for Verification: For the following:
  - 1. Plastic Laminates: 8 by 10 inches, for each type, color, pattern, and surface finish required.
    - a. Provide one Sample applied to core material with specified edge material applied to one edge.

# 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For casework manufacturer and Installer.
- B. Sample Warranty: For special warranty.
- C. Field quality-control reports.

### 1.6 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: AWI's Quality Certification Program certificates.

## 1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer and Licensed participate in AWI's Quality Certification Program.

# 1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

# 1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wetwork is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during remainder of construction period. Maintain temperature and relative humidity during remainder of construction period in range recommended for Project location by the AWI/AWMAC/WI's "Architectural Woodwork Standards."

- B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
- C. Field Measurements: Where casework is indicated to fit to existing construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.
- D. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before enclosing them, and indicate measurements on Shop Drawings.

#### 1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Delamination of components or other failures of glue bond.
    - b. Warping of components.
    - c. Failure of operating hardware.
  - 2. Warranty Period: Five years from date of Substantial Completion.

### PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Sidney Millwork Company.
  - 2. Stevens Industries, Inc.
  - 3. TMI Systems Design Corporation.
- B. Source Limitations: Obtain from single source from single manufacturer.

# 2.2 GENERAL REQUIREMENTS FOR CASEWORK

- A. Quality Standard: Unless otherwise indicated, comply with the AWI/AWMAC/WI's "Architectural Woodwork Standards" for grades of casework indicated for construction, finishes, installation, and other requirements.
  - 1. Grade: Premium.
  - 2. Provide labels and certificates from AWI certification program indicating that casework complies with requirements of grades specified.
- B. Product Designations:

- 1. Drawings indicate sizes, configurations, and finish materials of manufactured plastic-laminate-clad casework by referencing designated manufacturer's catalog numbers. Other manufacturers' casework of similar sizes and door and drawer configurations, of same finish materials, and complying with the Specifications may be considered. See Section 01 60 00 "Product Requirements."
- 2. Drawings indicate configurations of manufactured plastic-laminate-clad casework by referencing designations of Casework Design Series numbering system in the Appendix of the AWI/AWMAC/WI's "Architectural Woodwork Standards."

### 2.3 PLASTIC-LAMINATE-CLAD CASEWORK

- A. Design: Face-frame and Frameless cabinet construction with the following door and drawer-front style:
  - 1. Flush overlay.
- B. Grain Direction for Wood-Grain Plastic Laminate:
  - 1. Doors: Vertical with continuous vertical matching.
  - 2. Face Frame Members: Lengthwise.
  - 3. End Panels: Vertical.
  - 4. Bottoms and Tops of Units: Side to side.
  - 5. Knee Space Panels: Vertical.
  - 6. Aprons: Horizontal.

## C. Exposed Materials:

- 1. Plastic-Laminate Grade: HGL.
  - a. Colors and Patterns: Refer to Finish Schedule.
- 2. Edgebanding: Plastic laminate matching adjacent surfaces.

### D. Concealed Materials:

- 1. Plastic Laminate: Grade VGS unless otherwise indicated. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.
  - a. Colors and Patterns: As selected by Architect from manufacturer's full range.
  - b. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.
- 2. Thermally Fused Laminate (TFL) Panels: Provide thermally fused laminate panels for semiexposed surfaces unless otherwise indicated.
  - a. Colors and Patterns: As selected by Architect from manufacturer's full range.
  - b. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.

- 3. Hardboard: Use only for cabinet backs where exterior side of back is not exposed.
- 4. Metal for Steel Drawer Pans: Cold-rolled, carbon-steel sheet complying with ASTM A1008/A1008M; matte finish; suitable for exposed applications.
- 5. Unless otherwise indicated, provide specified edgebanding on all semiexposed edges.

#### 2.4 CASEWORK HARDWARE AND ACCESSORIES

- A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware.
  - 1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.
- B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, Type B01602, self-closing. Provide two hinges for doors less than 48 inches high, and provide three hinges for doors more than 48 inches high.
  - 1. Degrees of Opening: 135 degrees.
- C. Wire Pulls: Solid aluminum wire pulls, fastened from back with two screws.
  - 1. Provide two pulls for drawers more than 24 inches wide.
- D. Semirecessed Pulls: Plastic. For sliding doors, provide recessed plastic flush-pulls. Provide two pulls for drawers more than 24 inches wide.
- E. Door Catches: , dual, self-aligning, permanent magnet catch. Provide two catches on doors more than 48 inches high.
- F. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.
  - 1. Doors: Provide one bumper at top and bottom of closing edge of each swinging door.
  - 2. Drawers: Provide one bumper on back side of drawer front at each corner.
- G. Drawer Slides: ANSI/BHMA A156.9.
  - 1. Manufacturer's standard.
  - 2. Standard Duty (Grade 1).
  - 3. Heavy Duty (Grade 1HD-100): Side mount.
    - a. Type: Full extension.
    - b. Material: Epoxy-coated polymer slides.
    - c. Motion Feature: Soft close dampener.
  - 4. General-purpose drawers; provide 100 lb (45 kg) load capacity.
- H. Drawer and Hinged-Door Locks: Cylindrical (cam) type, five-pin tumbler, brass with chrome-plated finish, and complying with ANSI/BHMA A156.11, Grade 1.
  - 1. Provide a minimum of two keys per lock and six master keys.
  - 2. Provide locks on every door and drawer.

- a. Master key for up to 500 key changes.
- I. Adjustable Shelf Supports
  - 1. Pin-type, Single-pin metal shelf rests complying with ANSI/BHMA A156.9, Type B04013.

## 2.5 MATERIALS

- A. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.
- B. Particleboard: ANSI A208.1, Grade M-2.
- C. MDF: Medium-density fiberboard, ANSI A208.2, Grade 130.
- D. Hardboard: ANSI A135.4, Class 1 tempered.
- E. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Basis of Design: Wilsonart LLC.
    - b. Arborite.
    - c. Formica Corporation.
  - 2. Source Limitations: Obtain from single source from single manufacturer.
- F. PVC Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3.0 mm thick at doors and drawer fronts, 1.0 mm thick elsewhere.
- G. Thermally Fused Laminate Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.
  - 1. Edgebanding for Thermally Fused Laminate (TFL) Panels: PVC or polyester edgebanding matching thermally fused laminate panels.
- H. Glass for Glazed Doors:
  - 1. Clear tempered glass complying with ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 5.0 mm thick.
- I. Frameless Glass Doors: Clear tempered glass complying with ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 6.0 mm thick; with exposed edges seamed before tempering.

### 2.6 FABRICATION

- A. Plastic-Laminate-Clad Cabinet Construction: As required by referenced quality standard, but not less than the following:
  - 1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard.
  - 2. Shelves: 3/4-inch-thick particleboard.
  - 3. Backs of Casework: 1/2-inch-thick particleboard or MDF where exposed, 1/4-inch-thick hardboard dadoed into sides, bottoms, and tops where not exposed.
  - 4. Drawer Fronts: 3/4-inch particleboard.
  - 5. Drawer Sides and Backs: 1/2-inch-thick particleboard or MDF, with glued dovetail or multiple-dowel joints.
  - 6. Drawer Bottoms: 1/4-inch-thick particleboard or MDF glued and dadoed into front, back, and sides of drawers.
  - 7. Drawer Bodies: Steel drawer pans formed from 0.0359-inch-thick metal, metallic phosphate treated, and finished with manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat with a minimum dry film thickness of 1 mil for topcoat and 2 mils for system.
  - 8. Doors 48 Inches High or Less: 3/4 inch thick, with particleboard or MDF cores.
  - 9. Stiles and Rails of Glazed Doors More Than 48 Inches High: 1-1/16 inches thick, with solid wood cores.
- B. Filler Strips: Provide as needed to close spaces between casework and walls, ceilings, and equipment. Fabricate from same material and with same finish as casework.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Grade: Install casework to comply with same quality standard grade as item to be installed.
- B. Install casework level, plumb, and true in line; shim as required using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch. Bolt adjacent cabinets together with joints flush, tight, and uniform.

- D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten cabinets to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions. Align similar adjoining doors to a tolerance of 1/16 inch.
- E. Fasten casework to adjacent units and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI/AWMAC/WI's "Architectural Woodwork Standards."
- F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
- G. Adjust operating hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

## 3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
  - 1. Inspection entity shall prepare and submit report of inspection.

#### 3.4 CLEANING

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 12 32 16

#### SECTION 12 36 61.16 - SOLID SURFACING COUNTERTOPS

### PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

#### A. Section Includes:

- 1. Solid surface material countertops.
- 2. Solid surface material casework frame.

## 1.3 ACTION SUBMITTALS

- A. Shop Drawings: For countertops. Show materials, finishes, edge profiles and methods of joining.
  - 1. Show locations and details of joints.
  - 2. Show direction of directional pattern, if any.
- B. Samples for Verification: For the following products:
  - 1. Countertop material, 6 inches square.
  - 2. Wood trim, 8 inches long.
  - 3. One full-size solid surface material countertop, with front edge, 8 by 10 inches, of construction and in configuration specified.

## 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

# 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

## 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful inservice performance.
- B. Installer Qualifications: Fabricator of countertops.
- C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
  - 1. Build mockup of typical countertop as shown on Drawings.
  - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.7 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

### 1.8 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

### PART 2 - PRODUCTS

## 2.1 SOLID SURFACE COUNTERTOP MATERIALS (SS-1)

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Basis of Design: Wilsonart LLC.
    - b. E. I. du Pont de Nemours and Company.
    - c. Meganite Inc.
  - 2. Type: Provide Standard type unless Special Purpose type is indicated.
  - Colors and Patterns: Refer to Finish Schedule.
- B. Particleboard: ANSI A208.1, Grade M-2.

#### 2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
  - 1. Grade: Premium.

- B. Configuration:
  - 1. Front: Straight, slightly eased at top.
- C. Countertops: 1/4-inch-thick, solid surface material laminated to 3/4-inch-thick particleboard with exposed edges built up with 3/4-inch-thick, solid surface material.
- D. Backsplashes: 1/2-inch-thick, solid surface material.
- E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
  - 1. Fabricate with loose backsplashes for field assembly.
  - 2. Install integral sink bowls in countertops in the shop.
- F. Joints: Fabricate countertops without joints.
- G. Joints: Fabricate countertops in sections for joining in field.
  - 1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.

### 2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

### **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten 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 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 solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- 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 07 92 00 "Joint Sealants."

END OF SECTION 12 36 61.16

### SECTION 12 66 00 - TELESCOPING STANDS

### PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Electrically operated telescoping stands.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For telescoping stands in both stacked and extended positions.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product certificates.
- C. Field quality-control reports.

## 1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code Steel."
  - 2. AWS D1.3/D1.3M, "Structural Welding Code Sheet Steel."

### PART 2 - PRODUCTS

# 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Telescoping stands shall withstand the effects of gravity loads, operational loads, and other loads and stresses according to ICC 300.
- B. Accessibility Standard: Comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design and ICC A117.1.

## 2.2 TELESCOPING STANDS

- A. System Description: Operable system of multiple-tiered seating on interconnected folding platforms that close for storage, without being dismantled, into a nested stack. Telescoping-stand units permit opening and closing of adjacent, individual and multiple rows, and close with vertical faces of platforms in the same vertical plane.
  - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 2. Telescoping-Stands Standard: ICC 300.
- B. Wall-Attached Telescoping Stands: Forward-folding system, in which the bleachers open in the forward direction by moving the front row away from the stack to the fully extended position and the rear of bleacher understructure permanently attaches to wall construction.
  - 1. Basis of Design:
    - a. Hussey Seating Company.
    - b. Sheridan Seating Bleachers.
  - 2. Operation: Electrically operated, with non-friction-type, integral power unit.
  - 3. Electrical Characteristics for Each Seating Section:
    - a. Horsepower: 1/2.
    - b. Voltage: 208 V ac, three phase, 60 hertz.

### 4. Electrical Controls:

- a. Control Devices: Wall-attached control system.
- b. Limit Switches: Automatically stop power system when telescoping stands reach fully opened or closed positions.
- c. Motion Monitor: Flashing light with self-contained warning horn, rated at 85 dB at 10 feet, mounted under telescoping seating for audio and visual warning during operation.
- d. Transformer: As required to coordinate current characteristics of motor and control station with building electrical system.

## 2.3 COMPONENTS

- A. Benches: Seats and skirts.
  - 1. Material: Steel sheet with vinyl-clad finish.
    - a. Color: As selected by Architect from manufacturer's standard.
  - 2. Bench Height: Not less than 16 inches or more than 18 inches.
  - 3. Bench Depth: 12 inches.
- B. Wheelchair-Accessible Seating: Locate seating cutouts to provide wheelchair-accessible seating at locations indicated on Drawings.
  - 1. Equip tiers adjacent to wheelchair-accessible seating with front rails as required by ICC 300.
  - 2. Equip cutouts with full-width front closure panels that match decking construction and finish and that extend from underside of tiers adjacent to cutouts to 1-1/2 inches from finished floor.
- C. Deck: Aluminum.
  - 1. Finish: Clear anodized.
    - a. Color: As selected by Architect from manufacturer's standard colors.
- D. Risers: Steel sheet with manufacturer's standard, rust-inhibiting coating or hot-dip galvanized finish.
- E. Safety Rails: Steel, finished with manufacturer's standard powder coat system.
  - 1. Self-storing mid-aisle handrails located at centerline of each aisle with seating on both sides.
  - 2. End rails (guards) that are telescoping and self-storing.
  - 3. Back rails (guards) along rear of units where required by ICC 300.
  - 4. Fixed front rails (guards) along front of units where required by ICC 300.
  - 5. Fixed rails around accessible seating cutouts and truncations.
  - 6. Removable, programming-support front rails to allow seating in upper rows while lower rows remain in the stored position.
  - 7. Color: Match Architect's sample.
- F. Understructure: Structural steel.
  - 1. Finish: Manufacturer's standard rust-inhibiting finish.
  - 2. Color: Manufacturer's standard.
- G. Support Column Wheels: Nonmarring, soft, rubber-face wheel assembly under each support column.
  - 1. Include wheels of size, number, and design required to support stands and operate smoothly without damaging the flooring surface, but no fewer than four per column or less than 4 inches in diameter and 1-1/2 inch wide.

### H. Control Devices:

1. Wall Attached: Keyed-switch control station, located within full view of each stand and its movement area. Provide two keys per station.

### 2.4 ACCESSORIES

## A. Steps:

- 1. Slip-resistant, abrasive tread nosings surfaces at aisles.
- 2. Intermediate aisle steps, fully enclosed, at each aisle.
- 3. Transitional top step, fully enclosed, at each aisle where last row of telescoping stands is adjacent to a cross aisle.
- 4. Removable front steps, fully enclosed, at each aisle, that engage with front row to prevent accidental separation or movement and are equipped with a minimum of four skid-resistant feet.
- B. Portable Stairs: Portable access-stair units equipped with handrails, with no fewer than four full-swiveling, nonmarring wheels and a locking mechanism to prevent movement during use.

## C. Closure Panels and Void Fillers:

- 1. Aisle closures at foot level that produce flush vertical face at aisles when system is stored.
- 2. End panels covering exposed ends of stands in the stored position.
- 3. Back panels covering rear of freestanding units. Panels extend full height and width of unit.
- 4. Panels at cutouts and truncations for accessible seating.
- 5. Rear fillers including supports for closing openings between top row and rear wall of adjoining construction.
- 6. Gap fillers for closing openings between stand units or between stand units and adjoining construction.

#### 2.5 FABRICATION

- A. Fabricate telescoping stands to operate easily without special tools or separate fasteners unless otherwise indicated.
- B. Round corners and edges of components and exposed fasteners to reduce snagging and pinching hazards.
- C. Form exposed work with flat, flush surfaces, level and true in line.
- D. Supports: Fabricate supports to withstand, without damage to components, the forces imposed by use of stands without failure or other conditions that might impair their usefulness.
  - 1. Cantilever bench seat supports to produce toe space uninterrupted by vertical bracing.

### PART 3 - EXECUTION

# 3.1 INSTALLATION

A. Install telescoping stands according to ICC 300 and manufacturer's written instructions.

# 3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
  - 1. ICC 300 Inspection: Inspect installed telescoping stands to verify that construction, installation, and operation are according to ICC 300 requirements.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Telescoping stands will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

# 3.3 ADJUSTING

A. Adjust backrests so that they are at proper angles and aligned with each other in uniform rows.

## 3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to inspect, adjust, operate, and maintain telescoping stands.

END OF SECTION 12 66 00