

PROJECT MANUAL FOR

Pleasant Point Passamaquoddy Reservation Housing Authority
Kikunol Housing Phase III – New Building

Issue for Construction

June 19, 2026

ARCHITECT

Design Group Collaborative
40 Church Street
Ellsworth, ME 04605

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ADVERTISEMENT FOR BIDS

DOCUMENT 001113 - ADVERTISEMENT FOR BIDS

1.1 PROJECT INFORMATION

- A. Notice to Bidders: Bidders may submit bids for project as described in this Document. Submit bids according to the Instructions to Bidders.
 - 1. Regulatory Requirements: Pleasant Point Passamaquoddy Reservation Housing Authority PPRHA shall govern submittal, opening, and award of bids.
- B. Project Identification: Kikunol Housing Phase III
 - 1. Project Location: Skicin Road, Pleasant Point, Perry, Maine
- C. Owner: Pleasant Point Passamaquoddy Reservation Housing Authority.
- D. Architect: Design Group Collaborative, 40 Church Street, Studio A, Ellsworth, Maine 04605 (207)-664-0560
- E. Project Description: Project consists of new construction of four separated multi-family homes and includes limited earthwork, site utilities and site improvements, paving and landscaping as well as concrete foundation and slab-on-grade, wood framing and partitions, insulation, gypsum wall board walls and ceilings, resilient and tile flooring, cabinetry, painting, wood doors and hardware, toilet accessories, electrical, heating and ventilating and other Work indicated in the Contract Documents.
- F. Construction Contract: Bids will be received for the following Work:
 - 1. General Contract (all trades).

1.2 BID SUBMITTAL AND OPENING

- A. Owner will receive sealed lump sum bids until the bid time and date at the location given below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:
 - 1. Bid Date: July 24, 2026
 - 2. Bid Time: 2:00 p.m local time.
 - 3. Location: Office of the Housing Director, Janelle Sapiel, Pleasant Point Passamaquoddy Reservation Housing Authority, 15 Elders Way, Suite 201, Perry, Maine
- B. Bids will be thereafter be privately opened.

1.3 BID SECURITY

- A. Bid security shall be submitted with each bid in the amount of **5** percent of the bid amount. No bids may be withdrawn for a period of **30** days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.

SECTION 00 11 13
ADVERTISEMENT FOR BIDS

1.4 PREBID MEETING

- A. Prebid Meeting: See Document 002513 "Prebid Meetings."
- B. Prebid Meeting: A Prebid meeting for all bidders will be held at Skicin Road, Pleasant Point, Perry, Maine on June 24, 2026 at 1:00 p.m., local time. Prospective prime bidders are requested to attend.

1.5 DOCUMENTS

- A. Printed and Online Procurement and Contracting Documents: Obtain after June 19, 2026, by contacting Print Bangor, (207)-947-8049. Only complete sets of documents will be issued.

1.6 TIME OF COMPLETION

- A. Successful bidder shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time.

1.7 BIDDER'S QUALIFICATIONS

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

1.8 NOTIFICATION

- A. This Advertisement for Bids document is issued by Design Group Collaborative.

END OF DOCUMENT 001113

SECTION 00 11 16
INVITATION TO BID

DOCUMENT 001116 - INVITATION TO BID

1.1 PROJECT INFORMATION

- A. Notice to Bidders: Bidders are invited to submit bids for Project as described in this Document according to the Instructions to Bidders.
- B. Project Identification: Kikunol Housing Phase III
 - 1. Project Location: Skicin Road, Pleasant Point, Perry, Maine
- C. Owner: Pleasant Point Passamaquoddy Reservation Housing Authority
- D. Architect: Design Group Collaborative, 40 Church Street, Studio A, Ellsworth, Maine 04605 (207)-664-0560
- E. Project Description: Project consists of new construction of one building with four separated multi-family homes and includes earthwork, site utilities and site improvements, paving and landscaping as well as concrete foundations and slab-on-grade, wood framing and partitions, insulation, gypsum board walls and ceilings, resilient and tile flooring, cabinetry, painting, wood doors and hardware, toilet accessories, electrical, heating and ventilating and other Work indicated in the Contract Documents, complete and ready for use
- F. Construction Contract: Bids will be received for the following Work:
 - 1. General Contract (all trades).

1.2 BID SUBMITTAL AND OPENING

- A. Owner will receive sealed bids until the bid time and date at the location indicated below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:
 - 1. Bid Date: July 24, 2026
 - 2. Bid Time: 2:00 p.m. local time.
 - 3. Location: Pleasant Point Passamaquoddy Reservation Housing Authority, 15 Elders Way, Suite 201, Perry, Maine
- B. Bids will be thereafter privately opened.

1.3 BID SECURITY

- A. Bid security shall be submitted with each bid in the amount of **5** percent of the bid amount. No bids may be withdrawn for a period of **60** days after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.

SECTION 00 11 16
INVITATION TO BID

1.4 PREBID CONFERENCE

- A. A prebid conference for all bidders will be held at Skicin Road, Pleasant Point, Perry, Maine on June 24, 2026 at 12:00 p.m., local time. Prospective bidders are requested to attend.

1.5 DOCUMENTS

- A. Printed and Online Procurement and Contracting Documents: Obtain after June 19, 2026 by contacting Print Bangor (207)-947-8049 Documents will be provided to prime bidders only; only complete sets of documents will be issued.

1.6 TIME OF COMPLETION

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

1.7 BIDDER'S QUALIFICATIONS

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

END OF DOCUMENT 001116

DRAFT AIA® Document A701™ – 2018

Instructions to Bidders

for the following Project:
Kikunol Housing Phase III

THE OWNER:

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

[Pleasant Point Passamaquoddy Reservation Housing Authority](#)
[15 Elders Way, Suite 201](#)
[Perry, Maine](#)

THE ARCHITECT:

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

Design Group Collaborative
40 Church Street, Studio A, Ellsworth, ME 04605

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ADDITIONS AND DELETIONS:

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

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

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

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

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ARTICLE 1 DEFINITIONS

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

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

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

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

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

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

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

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

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

ARTICLE 2 BIDDER'S REPRESENTATIONS

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

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

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

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

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

« »Procurement and Contracting Documents will be sent to Bidders only after 9am,
Friday, June 19, 2026.

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

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

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

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

§ 3.2 Modification or Interpretation of Bidding Documents

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

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

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

« »All correspondence in connection with this Project will be addressed to the office of the Architect, Attention: Louis Schellhase, Design Group Collaborative via E-MAIL lschellhase@dgcarchitects.com.

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

§ 3.3 Substitutions

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

§ 3.3.2 Substitution Process

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

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

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

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

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

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

§ 3.4 Addenda

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

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

« » Addenda will be transmitted to Bidders via E-MAIL. Receipt response of E-mail required.

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

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

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

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Preparation of Bids

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

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

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

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

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

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

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

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

§ 4.2 Bid Security

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

«A completed bid bond form is required to be attached to the Bid Form, in the amount constituting five percent (5%) of the Base Bid amount above. AIA Document A310-2010 "Bid Bond" is the recommended form for a bid bond. A bid bond acceptable to Owner, or other bid security as described in the Instructions to Bidders, is required to be attached to the Bid Form as a supplement. Copies of AIA standard forms may be obtained from The American Institute of Architects; <https://www.aiacontracts.org/>; email: docspurchases@aia.org; No bids may be withdrawn for a period of 120 days after opening of bids.

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

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

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning 30 days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

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

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

« → Hardcopies of the Bids will be delivered to the office of the Architect, Attn: Office of the Housing Director, Janelle Sapiel, Pleasant Point Passamaquoddy Reservation Housing Authority, 15 Elders Way, Suite 201, Perry, Maine No later than 2:00pm on July 24, 2026.

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

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

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

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

§ 4.4 Modification or Withdrawal of Bid

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

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

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

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

Bid security may be returned when the affected bidder was not the lowest responsive and responsible bidder.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

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

§ 5.2 Rejection of Bids

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

§ 5.3 Acceptance of Bid (Award)

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

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

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

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

§ 6.2 Owner's Financial Capability

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

§ 6.3 Submittals

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

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

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

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

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

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

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

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

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

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

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

« »

§ 7.2 Time of Delivery and Form of Bonds

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

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

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

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

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

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

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

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

«AIA A105 - 2017 »

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

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

« »

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

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

« »

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

« »

- .5 Drawings

Number	Title	Date	Pages
Kikunol Housing Phase III	Bid Documents	June 19, 2026	

- .6 Specifications

Section	Title	Date	Pages
Project Manual for Kikunol Housing Phase III	Bid Documents	06/19/2026	

- .7 Addenda:

Number	Date	Pages

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

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

« »

[« »] The Sustainability Plan:

Title	Date	Pages

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

Document	Title	Date	Pages

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

« »

SECTION 00 25 13
PREBID MEETING

DOCUMENT 002513 - PREBID MEETING

1.1 PREBID MEETING

- A. Architect will conduct a Prebid meeting as indicated below:
 - 1. Meeting Date: June 24, 2026
 - 2. Meeting Time: 12:00 p.m. local time.
 - 3. Location: Skicin Road, Pleasant Point, Perry, Maine
- B. Attendance:
 - 1. Prime Bidders: Attendance at Prebid meeting is recommended.
 - 2. Subcontractors: Attendance at Prebid meeting is recommended.
- C. Agenda: Prebid meeting agenda will include review of topics that may affect proper preparation and submittal of bids, including the following:
 - 1. Procurement and Contracting Requirements:
 - a. Advertisement for Bids.
 - b. Instructions to Bidders.
 - c. Bidder Qualifications.
 - d. Bonding.
 - e. Insurance.
 - f. Bid Security.
 - g. Bid Form and Attachments.
 - h. Bid Submittal Requirements.
 - i. Bid Submittal Checklist.
 - j. Notice of Award.
 - 2. Communication during Bidding Period:
 - a. Obtaining documents.
 - b. Bidder's Requests for Information.
 - c. Bidder's Substitution Request/Prior Approval Request.
 - d. Addenda.
 - 3. Contracting Requirements:
 - a. Agreement.
 - b. The General Conditions.
 - c. The Supplementary Conditions.
 - d. Other Owner requirements.
 - 4. Construction Documents:
 - a. Scopes of Work.

SECTION 00 25 13
PREBID MEETING

- b. Temporary Facilities.
 - c. Use of Site.
 - d. Work Restrictions.
 - e. Alternates, Allowances, and Unit Prices.
 - f. Substitutions following award.
 - 5. Separate Contracts:
 - a. Work by Owner.
 - b. Work of Other Contracts.
 - 6. Schedule:
 - a. Project Schedule.
 - b. Contract Time.
 - c. Liquidated Damages.
 - d. Other Bidder Questions.
 - 7. Site/facility visit or walkthrough.
 - 8. Post-Meeting Addendum.
- D. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes to attendees and others known by the issuing office to have received a complete set of Procurement and Contracting Documents. Minutes of meeting are issued as Available Information and do not constitute a modification to the Procurement and Contracting Documents. Modifications to the Procurement and Contracting Documents are issued by written Addendum only.
- 1. Sign-in Sheet: Minutes will include list of meeting attendees.
 - 2. List of Planholders: Minutes will include list of planholders.

END OF DOCUMENT 002513

SECTION 00 41 13
BID FOR – STIPULATED SUM (SINGLE-PRIME CONTRACT)

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

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: Kikunol Housing Phase III
- C. Project Location: Skicin Road, Pleasant Point, Perry, Maine
- D. Owner: Pleasant Point Passamaquoddy Reservation Housing Authority
- E. Architect: Design Group Collaborative
- F. Architect Project Number: 132601

1.2 CERTIFICATIONS AND BASE BID

- A. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by Design Group Collaborative and Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:
 - 1. _____ Dollars (\$_____).
 - 2. The above amount may be modified by amounts indicated by the Bidder on the attached and Document 004323 "Alternates Form."

1.3 BID GUARANTEE

- A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice of Award, if offered within 60 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:
 - 1. _____ Dollars (\$_____).
- B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

SECTION 00 41 13
BID FOR – STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.4 TIME OF COMPLETION

- A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect, and shall fully complete by June 30, 2027.

1.5 ACKNOWLEDGEMENT OF ADDENDA

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

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

1.6 BID SUPPLEMENTS

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

1. Bid Form Supplement - Alternates.
2. Bid Form Supplement - Bid Bond Form (AIA Document A310-2010).

1.7 CONTRACTOR'S LICENSE

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

1.8 SUBMISSION OF BID

- A. Respectfully submitted this ____ day of _____, _____
- B. Submitted By: _____ (Name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).
- F. Street Address: _____.
- G. City, State, Zip: _____.
- H. Phone: _____.

SECTION 00 41 13
BID FOR – STIPULATED SUM (SINGLE-PRIME CONTRACT)

I. License No.: _____.

END OF DOCUMENT 004113

SECTION 00 43 13
BID SECURITY FORMS

DOCUMENT 004313 - BID SECURITY FORMS

1.1 BID FORM SUPPLEMENT

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

1.2 BID BOND FORM

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

END OF DOCUMENT 004313

SECTION 00 43 23
ALTERNATES FORM

DOCUMENT 004323 - ALTERNATES FORM

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Prime Contract: _____.
- C. Project Name: Kikunol Housing Phase III
- D. Project Location: Skicin Road, Pleasant Point, Perry, Maine
- E. Owner: Pleasant Point Passamaquoddy Reservations Housing Authority
- F. Architect: Design group Collaborative
- G. Architect Project Number: 132601

1.2 BID FORM SUPPLEMENT

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

1.3 DESCRIPTION

- A. The undersigned Bidder proposes the amount below be added to or deducted from the Base Bid if particular alternates are accepted by Owner. Amounts listed for each alternate include costs of related coordination, modification, or adjustment.
- B. If the alternate does not affect the Contract Sum, the Bidder shall indicate "NO CHANGE."
- C. If the alternate does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."
- D. The Bidder shall be responsible for determining from the Contract Documents the affects of each alternate on the Contract Time and the Contract Sum.
- E. Owner reserves the right to accept or reject any alternate, in any order, and to award or amend the Contract accordingly within **60** days of the Notice of Award unless otherwise indicated in the Contract Documents.
- F. Acceptance or non-acceptance of any alternates by the Owner shall have no affect on the Contract Time unless the "Schedule of Alternates" Article below provides a formatted space for the adjustment of the Contract Time.

SECTION 00 43 23
ALTERNATES FORM

1.4 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Add Propane Tank Enclosures Roof and Walls, Rear Storage Units Walls, Roof and Slab, and Fences.

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

- B. Alternate No. 2: Remove Base Bid Two-Bedroom Mechanical Attics.

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

- C. Alternate No. 3: Two-Bedroom Units Mechanical Ventilation system.

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

1.5 SUBMISSION OF BID SUPPLEMENT

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

END OF DOCUMENT 004323

SECTION 00 50 00
CONTRACTING FORMS AND SUPPLEMENTS

DOCUMENT 005000 – CONTRACTING FORMS AND SUPPLEMENTS

PART 1 - GENERAL

1.1 AGREEMENT AND CONDITIONS OF THE CONTRACT

- A. See Section 005213 for the Agreement form to be executed.
- B. General Conditions are included in the Agreement.
- C. The Agreement is based on AIA A105 - 2017.

1.2 FORMS

- A. Use the following forms for the specified purposes unless otherwise indicated elsewhere in the Contract Documents.
- B. Preconstruction Forms:
 - 1. Form of Performance Bond and Labor and Material Bond: AIA Document A312, "Performance Bond and Payment Bond."
- C. Post-Award Certificates and Other Forms:
 - 1. Schedule of Values Form: AIA G703.
 - 2. Application for Payment Form: AIA G702 and G703.
- D. Clarification and Modification Forms:
 - 1. Supplemental Instruction Form: AIA G710.
 - 2. Construction Change Directive Form: AIA G714.
 - 3. Change Order Form: AIA G701.
- E. Closeout Forms:
 - 1. Certificate of Substantial Completion Form: AIA G704.

1.3 REFERENCE STANDARDS

- A. AIA A105 - Standard Short Form of Agreement Between Owner and Contractor; 2017.
- B. AIA G701 - Change Order; 2001.
- C. AIA G702 - Application and Certificate for Payment; 1992.
- D. AIA G703 - Continuation Sheet; 1992.
- E. AIA G704 - Certificate of Substantial Completion; 2000.

SECTION 00 50 00
CONTRACTING FORMS AND SUPPLEMENTS

- F. AIA G710 - Architect's Supplemental Instructions; 1992.
- G. AIA G714 - Construction Change Directive; 2007.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF DOCUMENT 005000

SECTION 00 52 13
AGREEMENT FORM A105

DOCUMENT 005213 – AGREEMENT FORM A105

PART 1 - GENERAL

1.1 FORM OF AGREEMENT

1.2 The Agreement to be executed is attached following this page.

1.3 RELATED REQUIREMENTS

A. General Conditions are included in the Agreement.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF DOCUMENT 005213

17.1 The Contractor and the Contractor's surety, if any, shall be liable for and shall pay the Owner the sum of \$750 as liquidated damages for each calendar day of delay until the work is substantially complete.

17.2 The Owner shall withhold 5% retainage.

17.2.1 All work shall be guaranteed for a full one year period subsequent to final approval. Any actions required to correct work within this warranty period shall be the responsibility of the Contractor.

17.3 Liability Insurance shall be carried with **Pleasant Point Reservation Housing Authority** listed as additionally insured for the following limits:

General Liability	\$2,000,000
Each occurrence	\$1,000,000
Automobile Liability	\$1,000,000
Workers Compensation	As prescribed by Law

The Insurance Certificate shall stipulate that a per project endorsement applies.

17.4 "Reasonable overhead and profit", as described in Article 10.1, shall mean an allowance to be added to or subtracted from the "cost" in lieu of overhead and profit and of any other expense which is not included in the cost of the Work covered by the change. Percentage for a Contractor shall be 15% of any net increase or decrease of Cost of any Work performed by his own forces and 10% for Work performed by any Subcontractors.

SECTION 00 73 46
WAGE DETERMINATION SCHEDULE

SECTION 007346 – WAGE DETERMINATION SCHEDULE

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the wage determination requirements for Contractors as issued by the State of Maine Department of Labor Bureau of Labor Standards or the United States Department of Labor.

1.3 REQUIREMENTS

- A. Conform to the wage determination schedule for this project which is shown on the following page.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

SECTION 00 73 46
WAGE DETERMINATION SCHEDULE

"General Decision Number: ME20260013 01/02/2026

Superseded General Decision Number: ME20250013

State: Maine

Construction Type: Building

County: Washington County in Maine.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

Modification Number	Publication Date
0	01/02/2026

IRON0007-034 09/16/2025

	Rates	Fringes
IRONWORKER (ORNAMENTAL AND REINFORCING).....	\$ 33.65	26.27

LABO0327-003 12/01/2023

	Rates	Fringes
LABORER: Common or General (Industrial Work Only).....	.\$ 21.90	19.72

PLUM0716-001 08/01/2025

	Rates	Fringes
PIPEFITTER.....	.\$ 40.00	24.71

SUME2014-022 01/31/2017

	Rates	Fringes
BRICKLAYER.....	\$ 27.38	9.14
CARPENTER, Includes Form Work....	\$ 20.14	8.23
CEMENT MASON/CONCRETE FINISHER...	\$ 16.13	3.82
ELECTRICIAN.....	\$ 22.78	7.35
IRONWORKER, STRUCTURAL.....	\$ 22.71	10.88

SECTION 00 73 46
WAGE DETERMINATION SCHEDULE

LABORER: Common or General.....	\$ 14.14	4.20
LABORER: Mason Tender - Brick...	\$ 18.33	2.01
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 20.42	3.12
OPERATOR: Crane.....	\$ 24.07	6.08
PAINTER (Brush and Roller).....	\$ 17.38	4.70
SHEET METAL WORKER, Includes HVAC Duct Installation.....	\$ 16.97	1.92
TRUCK DRIVER: Dump Truck.....	\$ 14.79	2.53

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

=====

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least \$13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on this contract in 2025. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses

SECTION 00 73 46
WAGE DETERMINATION SCHEDULE

(29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in

SECTION 00 73 46
WAGE DETERMINATION SCHEDULE

producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, reflects the date on which the classifications and rates under the "SA" identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

- a) a survey underlying a wage determination
- b) an existing published wage determination
- c) an initial WHD letter setting forth a position on a wage determination matter
- d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations.

Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

SECTION 00 73 46
WAGE DETERMINATION SCHEDULE

Branch of Construction Wage Determinations

Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

END OF GENERAL DECISION

END OF SECTION 007346

SECTION 01 10 00
SUMMARY

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work performed by Owner.
5. Multiple Work Packages.
6. Work under Owner's separate contracts.
7. Future work not part of this Project.
8. Owner-furnished/Owner-installed (OFOI) products.
9. Contractor's use of site and premises.
10. Coordination with occupants.
11. Work restrictions.
12. Specification and Drawing conventions.
13. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 017300 "Execution" for coordination of Owner-installed products.

1.3 PROJECT INFORMATION

A. Project Identification: Kikunol Housing Phase III

1. Project Location: Skicin Road, Pleasant Point, Perry, ME

B. Owner: Pleasant Point Passamaquoddy Reservation Housing Authority.

C. Architect: Design Group Collaborative, 40 Church Street, Studio A, Ellsworth, Maine 04605.
(207)-664-0560

D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:

SECTION 01 10 00
SUMMARY

1. Civil and Structural Engineering:
 - a. Hedefine Engineering & Design, Inc. PO Box 668, Ellsworth, ME 04605. (207)-664-0930
2. Mechanical, Electrical and Plumbing Engineering:
 - a. Carpenter Associates, 687 Stillwater Ave, Old Town, ME 04468 (207)-827-8001

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
 1. The work includes new construction of four separated multi-family homes and includes limited earthwork, site utilities and site improvements, paving and landscaping as well as concrete foundations and slab-on-grade, wood framing and partitions, insulation, gypsum board walls and ceilings, resilient and tile flooring, cabinetry, painting, wood doors and hardware, toilet accessories, electrical, heating and ventilating and other Work indicated in the Contract Documents, complete and ready for use.
- B. Type of Contract:
 1. Project will be constructed under a single prime contract.

1.5 PHASED CONSTRUCTION

- A. Partial site work will be completed under separate contract prior to commencement of this project.
 1. Rough Site Work under separate contract in preparation for Kikunol Housing Phase III – Siteworks, construction, including but not limited to: site demolition, excavation for future 4-unit building foundation , associated utility, drainage and stormwater treatment construction.
 - a. Substantial Completion:
 - 1) By October 6, 2026
 - b. Final Completion:
 - 1) October 26, 2026

1.6 OWNER-FURNISHED/OWNER-INSTALLED (OFOI) PRODUCTS

- A. The Owner will furnish and install products indicated.
- B. Owner-Furnished/Owner-Installed (OFOI) Products:
 1. Washing Machine
 2. Dryer

SECTION 01 10 00
SUMMARY

1.7 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Unrestricted Use of Site: Each Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
 - 1. Driveways, Walkways and Entrances: Keep parking lots and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.8 COORDINATION WITH OCCUPANTS

- A. Existing housing units at the Kikunol Housing project site will be fully occupied 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 access to site 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 approval of authorities having jurisdiction.
 - 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
 - 3. Equipment when not in use shall be shut off to minimize noise and air pollution.
 - 4. Maintain construction fencing, signage and traffic control to prevent access to construction site from existing adjacent housing.

1.9 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
 - 1. Weekend Hours: As approved by Architect and Owner.
 - 2. Early Morning Hours: As approved by Architect and Owner.
 - 3. Hours for Utility Shutdowns: As approved by Architect and Owner.

SECTION 01 10 00
SUMMARY

4. Provide 24 hour notice to Architect and Owner when performing work other than normal working hours.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
 1. Notify Architect and Owner not less than three days in advance of proposed utility interruptions.
 2. Obtain Architects written permission before proceeding with utility interruptions.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
 1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Owner's property is not permitted.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 01 23 00
ALTERNATES

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other Work of the Contract.
- C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

SECTION 01 23 00
ALTERNATES

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1; Add Propane Tank Enclosures Roof and Walls, Rear Storage Units Walls, Roof and Slab, and Fences.
 - 1. Base Bid: Concrete slabs for propane tanks.
 - 2. Alternate: Provide propane tank enclosures as well as rear storage units and fences as designed in the contract documents.
- B. Alternate No. 2; Two-Bedroom Units mechanical attic and pulldown stair.
 - 1. Base Bid: At the 2 Two-Bedroom Units, provide finished and insulated mechanical room within attic truss accessed by pull-down attic ladder and provide mechanical and plumbing units and accessories in this room as shown in contract documents.
 - 2. Alternate: At the 2 Two-Bedroom Units, delete the attic mechanical room, delete the first-floor linen closet, provide an attic access panel and expand Entry Closet 2. Eliminate gypsum wall board, plywood subfloor and insulation in mechanical room walls in attic space as well as floor-drain and convenience receptacle. Eliminate attic storage trusses and replace with typical truss. Install boiler, buffer tank, energy recovery ventilator, and make-up air unit in enlarged first floor Entry Closet 2.
- C. Alternate No. 3; Two-Bedroom Units Mechanical Ventilation system.
 - 1. Base Bid: Provide ventilation system as designed.
 - 2. Alternate: Remove energy recovery ventilator, and make-up air unit. Revise controls for bathroom fans.

END OF SECTION 012300

SECTION 01 25 00
SUBSTITUTION PROCEDURES

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for products selected under an alternate.
 - 2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use form acceptable to Architect.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.

SECTION 01 25 00
SUBSTITUTION PROCEDURES

- c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

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

SECTION 01 25 00
SUBSTITUTION PROCEDURES

1.6 PROCEDURES

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

1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.

SECTION 01 25 00
SUBSTITUTION PROCEDURES

- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

SECTION 012600 - 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. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
 - 2. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

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

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

- d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
 - 7. Proposal Request Form: Use form acceptable to Architect.

1.5 ADMINISTRATIVE CHANGE ORDERS

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

1.6 CHANGE ORDER PROCEDURES

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

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.8 WORK CHANGE DIRECTIVE

- A. Work Change Directive: Architect may issue a Work Change Directive on EJCDC Document C-940. 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 012600

SECTION 01 29 00
PAYMENT PROCEDURES

SECTION 012900 - 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.
- B. Related Requirements:
 - 1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Section 013200 "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 items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Owner's name.
 - c. Owner's Project number.
 - d. Name of Architect.
 - e. Architect's Project number.

SECTION 01 29 00
PAYMENT PROCEDURES

- f. Contractor's name and address.
 - g. 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. Round dollar amounts to whole dollars, with total equal to Contract Sum.
 - 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. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
 - 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
 - 6. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
 - 7. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 - 8. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 - 9. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
 - 10. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 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 paid for by Owner.
- B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

SECTION 01 29 00
PAYMENT PROCEDURES

1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit one signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One Copy shall include waivers of lien and similar attachments if required. Electronic processing is acceptable.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment including but limited to subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

SECTION 01 29 00
PAYMENT PROCEDURES

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Submittal schedule (preliminary if not final).
 5. List of Contractor's staff assignments.
 6. List of Contractor's principal consultants.
 7. Copies of building permits.
 8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 9. Initial progress report.
 10. Report of preconstruction conference.
 11. Certificates of insurance and insurance policies.
 12. Performance and payment bonds.
- I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Certification of completion of final punch list items.
 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 4. Updated final statement, accounting for final changes to the Contract Sum.
 5. AIA Document G706.

SECTION 01 29 00
PAYMENT PROCEDURES

6. AIA Document G706A.
7. AIA Document G707.
8. Evidence that claims have been settled.
9. 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.
10. Final liquidated damages settlement statement.
11. Proof that taxes, fees, and similar obligations are paid.
12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
 - 1. Post copies of list in Project meeting room, in temporary field office, and in prominent location in built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

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

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is

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required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - e. Indicate required installation sequences.
 - f. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:

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- a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
- a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Owner name.
 3. Owner's Project number.
 4. Name of Architect.
 5. Architect's Project number.
 6. Date.
 7. Name of Contractor.
 8. RFI number, numbered sequentially.
 9. RFI subject.
 10. Specification Section number and title and related paragraphs, as appropriate.
 11. Drawing number and detail references, as appropriate.
 12. Field dimensions and conditions, as appropriate.
 13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 14. Contractor's signature.

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15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716.
 1. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at scheduled construction progress meetings. Include the following:
 1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect
 4. RFI number, including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

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- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Architect's Data Files Not Available: Architect will not provide Architect's CAD drawing digital data files for Contractor's use during construction.
- B. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
 - 1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 - 2. Name file with submittal number or other unique identifier, including revision identifier.
 - 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within **three** days of the meeting.
- B. Preconstruction Conference: **Schedule and conduct** a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 30 days after execution of the Agreement.
 - 1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.

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- h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Sustainable design requirements.
 - o. Preparation of Record Documents.
 - p. Use of the premises
 - q. Work restrictions.
 - r. Working hours.
 - s. Owner's occupancy requirements.
 - t. Responsibility for temporary facilities and controls.
 - u. Procedures for moisture and mold control.
 - v. Procedures for disruptions and shutdowns.
 - w. Construction waste management and recycling.
 - x. Parking availability.
 - y. Office, work, and storage areas.
 - z. Equipment deliveries and priorities.
 - aa. First aid.
 - bb. Security.
 - cc. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
4. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent and sustainable design coordinator; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
5. Agenda: Discuss items of significance that could affect meeting sustainable design requirements, including the following:
- a. General requirements for sustainable design-related procurement and documentation.
 - b. Project closeout requirements and sustainable design certification procedures.
 - c. Role of sustainable design coordinator.
 - d. Construction waste management.
 - e. Construction operations and sustainable design requirements and restrictions.
6. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.

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2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Time schedules.
 - i. Weather limitations.
 - j. Manufacturer's written instructions.
 - k. Warranty requirements.
 - l. Compatibility of materials.
 - m. Acceptability of substrates.
 - n. Temporary facilities and controls.
 - o. Space and access limitations.
 - p. Regulations of authorities having jurisdiction.
 - q. Testing and inspecting requirements.
 - r. Installation procedures.
 - s. Coordination with other work.
 - t. Required performance results.
 - u. Protection of adjacent work.
 - v. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.

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- d. Submittal of written warranties.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for delivery of material samples, attic stock, and spare parts.
 - g. Preparation of Contractor's punch list.
 - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - i. Submittal procedures.
 - j. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at monthly intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site use.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of Proposal Requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.

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18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

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CONSTRUCTION PROGRESS DOCUMENTATION

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.

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- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

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

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

1.5 QUALITY ASSURANCE

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

1.6 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

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1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
 - a. Securing of approvals and permits required for performance of the Work.
 - b. Temporary facilities.
 - c. Construction of mock-ups, prototypes and samples.
 - d. Owner interfaces and furnishing of items.
 - e. Interfaces with Separate Contracts.
 - f. Regulatory agency approvals.
 - g. Punch list.
 - 3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 4. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 - 5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 - 6. Commissioning Time: Include no fewer than 15 days for commissioning.
 - 7. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 - 8. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Phasing: Arrange list of activities on schedule by phase.
 - 2. Work under More Than One Contract: Include a separate activity for each contract.
 - 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.

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CONSTRUCTION PROGRESS DOCUMENTATION

4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Uninterruptible services.
 - b. Use-of-premises restrictions.
 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Deliveries.
 - e. Installation.
 - f. Tests and inspections.
 - g. Adjusting.
 - h. Curing.
 - i. Startup and placement into final use and operation.
 - j. Commissioning.
 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and the Contract Time.
- F. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

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CONSTRUCTION PROGRESS DOCUMENTATION

2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Final Completion percentage for each activity.
- G. Recovery Schedule: When periodic update indicates the Work is [14] <Insert number> or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within 14 days of date established for commencement of the Work.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed.
1. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

SECTION 01 33 00
SUBMITTAL PROCEDURES

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

B. Related Requirements:

1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
4. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
5. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
6. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
7. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.3 SUBMITTAL SCHEDULE

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

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SUBMITTAL PROCEDURES

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

1.4 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

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

B. Options: Identify options requiring selection by Architect.

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- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.5 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
 - a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

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1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.6 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.

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- c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
 - 1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
 - 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 - 3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
 - 4. 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.
 - 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

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- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
 2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
 5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
 6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.
- H. Test and Research Reports:
1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
 2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
 3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
 4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
 5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
 6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.

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- c. Time period when report is in effect.
- d. Product and manufacturers' names.
- e. Description of product.
- f. Test procedures and results.
- g. Limitations of use.

1.7 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.8 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return.
 - 1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.
- B. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will return without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 01 40 00
QUALITY REQUIREMENTS

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of **[five]** **<Insert number>** previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency

SECTION 01 40 00
QUALITY REQUIREMENTS

qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

- E. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."
- G. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- H. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect[or **Construction Manager**].

1.4 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

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QUALITY REQUIREMENTS

- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 - 1. Project quality-control manager may also serve as Project superintendent
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
 - 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

SECTION 01 40 00
QUALITY REQUIREMENTS

1.7 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
 - 1. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

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QUALITY REQUIREMENTS

1.8 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 - 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Architect, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform duties of Contractor.

SECTION 01 40 00
QUALITY REQUIREMENTS

- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 6. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
 - 1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
 - 2. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

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QUALITY REQUIREMENTS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

3.2 REPAIR AND PROTECTION

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

END OF SECTION 014000

SECTION 01 42 00
REFERENCES

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

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

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
 - 1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.

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REFERENCES

- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

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

- B. Industry Organizations, List: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. Abbreviations and acronyms not included in this list are to mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."]The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; (see FGIA).
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; www.concrete.org.
9. ACP - American Clean Power; (Formerly: American Wind Energy Association); www.cleanpower.org.
10. ACPA - American Concrete Pipe Association; www.concretepipe.org.
11. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
12. AF&PA - American Forest & Paper Association; www.afandpa.org.
13. AGA - American Gas Association; www.aga.org.
14. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
15. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
16. AI - Asphalt Institute; www.asphaltinstitute.org.
17. AIA - American Institute of Architects (The); www.aia.org.
18. AISC - American Institute of Steel Construction; www.aisc.org.
19. AISI - American Iron and Steel Institute; www.steel.org.
20. AITC - American Institute of Timber Construction; (see PLIB).
21. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
22. AMPP - Association for Materials Protection and Performance; www.ampp.org.
23. ANSI - American National Standards Institute; www.ansi.org.
24. AOSA/SCST - Association of Official Seed Analysts (The)/Society of Commercial Seed Technologists (The); www.analyzeseeds.com.
25. APA - APA - The Engineered Wood Association; www.apawood.org.

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REFERENCES

26. APA - Architectural Precast Association; www.archprecast.org.
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASA - Acoustical Society of America; www.acousticalsociety.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (see ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; American Society of Mechanical Engineers (The); www.asme.org.
33. ASSE - ASSE International; (American Society of Sanitary Engineering); www.asse-plumbing.org.
34. ASTM - ASTM International; www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWI - Architectural Woodwork Institute; www.awinet.org.
37. AWP - American Wood Protection Association; www.awpa.com.
38. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
39. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
40. CPA - Composite Panel Association; www.compositepanel.org.
41. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
42. CSA - CSA Group; www.csagroup.org.
43. CSI - Construction Specifications Institute (The); www.csiresources.org.
44. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
45. CTA - Consumer Technology Association; www.cta.tech.
46. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
47. DHI - Door and Hardware Institute; www.dhi.org.
48. ECIA - Electronic Components Industry Association; www.ecianow.org.
49. FGIA - Fenestration and Glazing Industry Alliance; <https://fgiaonline.org>.
50. FM Approvals - FM Approvals LLC; www.fmapprovals.com.
51. FM Global - FM Global; www.fmglobal.com.
52. FSA - Fluid Sealing Association; www.fluidsealing.com.
53. GA - Gypsum Association; www.gypsum.org.
54. IAS - International Accreditation Service; www.iasonline.org.
55. ICC - International Code Council; www.iccsafe.org.
56. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
57. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
58. IES - Illuminating Engineering Society; www.ies.org.
59. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
60. IGMA - Insulating Glass Manufacturers Alliance; (see FGIA).
61. Intertek - Intertek Group; www.intertek.com.
62. ISO - International Organization for Standardization; www.iso.org.
63. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
64. MPI - Master Painters Institute; www.paintinfo.com.
65. NAIMA - North American Insulation Manufacturers Association; www.insulationinstitute.org.
66. NBI - New Buildings Institute; www.newbuildings.org.
67. NECA - National Electrical Contractors Association; www.necanet.org.
68. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
69. NEMA - National Electrical Manufacturers Association; www.nema.org.
70. NFPA - National Fire Protection Association; www.nfpa.org.
71. NFPA - NFPA International; (see NFPA).

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REFERENCES

72. NFRC - National Fenestration Rating Council; www.nfrc.org.
 73. NGA - National Glass Association; www.glass.org.
 74. NHLA - National Hardwood Lumber Association; www.nhla.com.
 75. NLGA - National Lumber Grades Authority; www.nlga.org.
 76. NSPE - National Society of Professional Engineers; www.nspe.org.
 77. NWRA - National Waste & Recycling Association; www.wasterecycling.org.
 78. PDI - Plumbing & Drainage Institute; www.pdionline.org.
 79. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
 80. RFCI - Resilient Floor Covering Institute; www.rfci.com.
 81. SAE - SAE International; www.sae.org.
 82. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
 83. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
 84. SPRI - Single Ply Roofing Industry; www.spri.org.
 85. TCNA - Tile Council of North America, Inc.; www.tcnatile.com.
 86. TPI - Truss Plate Institute; www.tpinst.org.
 87. UL - Underwriters Laboratories Inc.; www.ul.org.
 88. UL LLC - UL LLC; www.ul.com.
 89. USGBC - U.S. Green Building Council; www.usgbc.org.
 90. WCLIB - West Coast Lumber Inspection Bureau
 91. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
 92. WDMA - Window & Door Manufacturers Association; www.wdma.com.
 93. WI - Woodwork Institute; www.woodworkinstitute.com.
- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
1. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
 2. ICC - International Code Council; www.iccsafe.org.
 3. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
1. EPA - United States Environmental Protection Agency; www.epa.gov.
 2. GSA - U.S. General Services Administration; www.gsa.gov.
 3. HUD - U.S. Department of Housing and Urban Development; www.hud.gov.
 4. NIST - National Institute of Standards and Technology; www.nist.gov.
 5. OSHA - Occupational Safety & Health Administration; www.osha.gov.
 6. USDA - U.S. Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
 7. USDA - U.S. Department of Agriculture; Rural Utilities Service; www.usda.gov.

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REFERENCES

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Use Charges: Cost or use charges for temporary facilities, water, electricity, fuel and similar items shall be included in Contract Su, unless noted otherwise in the Supplementary Conditions.
- C. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum **2-inch** thick, galvanized-steel, chain-link fabric fencing; minimum **6 feet** high with galvanized-steel pipe posts; Fence shall, at a minimum, impede the public from accessing the active construction area, specifically including the open excavation for future building foundation.

2.2 TEMPORARY FACILITIES

- A. Field Offices:

Retain one of two subparagraphs below and revise based upon Project requirements.

- 1. Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Provide waste-collection containers in sizes adequate to handle waste from construction operation. Collect waste daily and, when containers are full, legally dispose of waste off-site.

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TEMPORARY FACILITIES AND CONTROLS

Comply with requirements of authorities having jurisdiction. Site shall be kept free of debris and cleaned every day before the site is left for the evening.

- C. Install project identification and other signs in locations approved by Owner to inform the public and persons seeking entrance to Project.

2.3 EQUIPMENT

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

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

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

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service as described in Section 26 05 00.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- C. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed

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TEMPORARY FACILITIES AND CONTROLS

construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

- D. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
 - 1. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: use designated areas of Project site for parking areas for construction personnel.
- D. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

Retain "Site Enclosure Fence" Paragraph below if required.

- B. Site Enclosure Fence: **Before construction operations begin** furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
 - 1. Extent of Fence: **As required to enclose portion determined sufficient to accommodate construction operations.**

Retain "Security Enclosure and Lockup" Paragraph below, because enclosure fence does not always provide adequate security against theft and vandalism.

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

- C. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

END OF SECTION 015000

SECTION 01 60 00
PRODUCT REQUIREMENTS

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for Contractor requirements related to Owner-furnished products.
 - 2. Section 012300 "Alternates" for products selected under an alternate.
 - 3. Section 012500 "Substitution Procedures" for requests for substitutions.
 - 4. Section 014200 "References" for applicable industry standards for products specified.
 - 5. Section 01770 "Closeout Procedures" for submitting warranties.

1.3 DEFINITIONS

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

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PRODUCT REQUIREMENTS

1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
- C. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."
- D. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
 3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

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

SECTION 01 60 00
PRODUCT REQUIREMENTS

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.
- C. Storage:
 - 1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
 - 2. Store products to allow for inspection and measurement of quantity or counting of units.
 - 3. Store materials in a manner that will not endanger Project structure.
 - 4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
 - 5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 7. Protect stored products from damage and liquids from freezing.
 - 8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

SECTION 01 60 00
PRODUCT REQUIREMENTS

- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

SECTION 01 60 00
PRODUCT REQUIREMENTS

3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.
 - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
- C. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 01 77 00
CLOSEOUT PROCEDURES

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final Completion procedures.
 - 3. List of incomplete items.
 - 4. Submittal of Project warranties.
 - 5. Final cleaning.
- B. Related Requirements:
 - 1. Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
 - 2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

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CLOSEOUT PROCEDURES

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
 - 5. Submit testing, adjusting, and balancing records.
 - 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of **10** days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 3. Complete startup and testing of systems and equipment.
 - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
 - 6. Advise Owner of changeover in utility services.

SECTION 01 77 00
CLOSEOUT PROCEDURES

7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list will state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1.8 LIST OF INCOMPLETE ITEMS

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

SECTION 01 77 00
CLOSEOUT PROCEDURES

1.9 SUBMITTAL OF PROJECT WARRANTIES

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.

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CLOSEOUT PROCEDURES

- b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
- c. Leave Project clean and ready for occupancy.

3.2 CORRECTION OF THE WORK

- A. Complete repair and restoration operations required by "Correction of the Work" Article in Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals.
- B. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
- D. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

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OPERATION AND MAINTENANCE DATA

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
 1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

1.5 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
 1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Construction Manager.
 7. Name and contact information for Architect.
 8. Name and contact information for Commissioning Authority.
 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

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OPERATION AND MAINTENANCE DATA

1.6 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

1.7 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor has delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. License requirements including inspection and renewal dates.
- C. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- D. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.8 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures,

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maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

1.9 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit **one** set of marked-up record prints.
 - 2. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one sets of file prints.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit Record Digital Data Files and three sets of Record Digital Data File plots.
 - 2) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.

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PROJECT RECORD DOCUMENTS

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- C. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

1.4 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

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PROJECT RECORD DOCUMENTS

- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
 - 1. Format: Annotated PDF electronic file.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 - 1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - 2. Format: Annotated PDF electronic file.
 - 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 - 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

1.5 MAINTENANCE OF RECORD DOCUMENTS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: concrete mix designs and reinforcement types
- B. Ready-Mixed Concrete Producer Qualifications: ASTM C 94/C 94M.
- C. Comply with ACI 301, "Specification for Structural Concrete"; ACI 117, "Specifications for Tolerances for Concrete Construction and Materials"; ACI 318 "Building Code Requirements for Structural Concrete", ACI 302 "Guide for Concrete Floor and Slab Construction", ACI 305 "Recommended Practice for Hot Weather Concreting", ACI 306 "Recommended Practice for Cold Weather Concreting" and CRSI's "Manual of Standard Practice", ACI PRC-229R-13, "Report on Controlled Low-Strength Materials", edition adopted by IBC 2021 (typical).
- D. Comply with MDOT Standard Specifications for concrete work associated with sidewalks.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain Steel Wire: ASTM A 82, where noted.
- C. Welded wire reinforcement shall be manufactured from domestic steel without foreign steel or billets used in the manufacturing process if the project is Federally funded or requires "buy American" clauses be met.
- D. Plain-Steel Welded Wire Reinforcement: ASTM A 1064, fabricated from as-drawn steel wire into flat sheets. Plain welded wire reinforcement shall have a minimum yield strength of 75,000 psi.
- E. Deformed-Steel Welded Wire Reinforcement: ASTM A 1064, flat sheet. Deformed welded wire reinforcement shall have a minimum yield strength of 80,000 psi.
- F. Portland Cement: ASTM C 150, Type I or II; or ASTM C 595, Type 1L.
 - 1. For cement used in exposure class S1 or greater, provide cement that has been tested according to ASTM C 1012 and meets the sulfate resistance criteria in ACI 318-14 Table 26.4.2.2(c). See drawings for the required exposure classes of various applications.
- G. Slag Cement: ASTM C989.
- H. Aggregates: ASTM C33, uniformly graded.

- I. Synthetic Fiber: ASTM C 1116, Type III, polypropylene fibers, 1/2 to 1-1/2 inches long.
- J. Air-Entraining Admixture: ASTM C 260.
- K. Chemical Admixtures: ASTM C 494, water reducing, high-range water reducing, water reducing and accelerating, and water reducing and retarding as required. Do not use calcium chloride or admixtures containing calcium chloride.
- L. Vapor barrier shall have all of the following qualities:
 - 1. Maintain permeance of less than 0.01 Perms [grains/(ft² · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
 - 2. Other performance criteria:
 - a. Strength: ASTM E1745 Class A.
 - b. Thickness: 15 mils minimum
 - c. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1
 - 3. Vapor barrier products:
 - a. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com.
 - 4. Sealing penetrations, perimeter/edge seal per manufacturers recommendations.
 - 5. Install vapor barrier directly beneath slab unless noted otherwise on drawings.
- M. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber (Fibre Expansion Joint), or ASTM D 1752, 3/4" thick self-expanding cork by W. R. Meadows, W. R. Grace or approved equal.
- N. Slab perimeter joint filler: 1/4" thick polyethylene, closed-cell expansion joint filler (Deck-O-Foam), with pre-scored removable strip to provide a uniform sealing reservoir in the joint, by W. R. Meadows.
- O. Perimeter and Under Slab Insulation: Rigid, Foamular 250, extruded polystyrene insulation board as manufactured by Owens Corning or approved equal.
- P. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- Q. Wall Sealer Compound: Cold-applied, emulsified-asphalt damproofing as manufactured by Desgussa Building Systems; Sonneborn Brand Products, Karnak Corporation or W.R. Meadows Inc. Acceptable products include:
 - 1. Sealmastic, Type 1; W. R. Meadows
 - 2. Hydrocide 600; Sonneborn Building Products.
 - 3. Karnak 100 AF; Karnac Chemical Corp.
- R. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. Do not use curing/sealing compounds on slabs scheduled to receive flooring, coatings, or adhesives

- S. Resilient caulk for control joints and expansion joints: Non-priming one component polyurethane sealant as manufactured by Sonneborn or equal.

2.2 MIXES

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Normal-Weight Concrete: See Structural Plans for Concrete Mix Design Table for project specific applications. If none are specified, prepare design mixes, proportioned according to ACI 301, as follows:
 - 1. Minimum Compressive Strength: Minimum 28-day strength shall be 4000 psi for slabs on grade and sidewalks and 3000 psi other applications unless otherwise noted on plans.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45
 - 3. Slump Limit: 4 inches or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.
 - 4. Air Content: Maintain within range permitted by ACI 301, generally between 5 to 7%. Do not allow air content of interior floor slabs to receive troweled finishes to exceed 3 percent.
- C. Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116.
 - 1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 CONCRETING

- A. Construct formwork according to ACI 301 and maintain tolerances and surface irregularities within ACI 347R limits of Class A, 1/8 inch for concrete exposed to view and Class C, 1/2 inch for other concrete surfaces.
- B. Place vapor retarder on prepared subgrade, with joints lapped 6 inches and sealed. Tape all seams per manufacturer instructions.
- C. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- D. Install construction, isolation, and contraction joints where indicated. Install full-depth joint-filler strips at isolation joints. Where no joints are indicated the following shall be considered minimum:
 - 1. Construction joints shall be placed such that no single placement exceeds 60 linear feet of wall.
 - 2. Slabs-on-grade: Saw out joints in slabs where indicated on Drawings or at a maximum spacing of 20' in each direction. Cut to be a depth of "t/4", where t equals the slab thickness in inches, and as narrow as possible, within 48 hours of finishing, to a true straight line.

- E. Construction joints shall be formed with keyed bulkheads. Reinforcement shall continue through the joint and additional reinforcement placed as required.
- F. Place concrete in a continuous operation and consolidate using mechanical vibrating equipment.
- G. Concrete shall be deposited continuously, in horizontal layers of such thickness (not deeper than 18") that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. Placing integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated for foreign materials shall not be deposited. No horizontal construction joints will be allowed in foundation walls.
- H. Concrete shall be compacted thoroughly by vibrating to produce a dense, homogeneous mass without voids or pockets. Vibrators should be placed in concrete rapidly so as to penetrate approximately 3" to 4" into the preceding lift so as to blend the two layers. Vibrating techniques must assure that when the coarse aggregate reaches the form, it stops and the matrix fills the voids
- I. Protect concrete from physical damage, premature drying, and reduced strength due to hot or cold weather during mixing, placing, and curing.
- J. Formed Surface Finish: Smooth-formed finish for concrete exposed to view, coated, or covered by waterproofing or other direct-applied material; rough-formed finish elsewhere.
- K. Slab Finishes: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces. Provide the following finishes:
 - 1. Scratch finish for surfaces to receive mortar setting beds.
 - 2. Float finish for interior steps and ramps and surfaces to receive waterproofing, roofing, or other direct-applied material.
 - 3. Troweled finish for floor surfaces and floors to receive floor coverings, paint, or other thin film-finish coatings.
 - 4. Trowel and fine-broom finish for surfaces to receive thin-set tile.
 - 5. Nonslip-broom finish to exterior concrete platforms, steps, sidewalks and ramps.
- L. Cure formed surfaces by moist curing for at least seven days.
- M. Begin curing concrete slabs after finishing. Keep concrete continuously moist for at least seven days or apply membrane-forming curing compound to concrete. Slabs scheduled to receive adhered flooring shall be moist cured only.
- N. Owner will engage a testing agency to perform field tests and to submit test reports. Contractor shall be responsible to coordinate with the Owner such testing as is required by the Owner. The Owner shall pay for such testing unless the testing shows the material to fail to meet the requirements of the contract documents, in which case the Contractor shall reimburse the Owner for the cost of such testing.
- O. Contractor shall notify the Engineer at least 48 hours prior to each placement. No concrete shall be placed until the Engineer has inspected the forms, reinforcement, inserts, sleeves or other work to be built into the concrete and has approved such.

- P. Protect concrete from damage. Repair surface defects in formed concrete and slabs.
- Q. Formwork for walls and other parts not supporting the weight of the concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations, but must remain a minimum of three days after the placement of the concrete.
- R. No live loads, including construction vehicle traffic, shall be allowed on slabs until the concrete has reached the specified 28-day strength, unless approved in writing by the Engineer.
- S. Splicing of bars and details not covered herein shall be in accordance with the recommendations of "Manual of Standard Practice for Detailing Reinforced Concrete Structures" ACI 315.

3.2 COLD WEATHER CONCRETING

- A. Concreting which occurs in cold weather shall comply with ACI 306 "Cold Weather Concreting", latest revision. ACI 306 states "Cold weather is defined as a period when, for more than 3 consecutive days, the following conditions exist:
 - 1. the average daily air temperature is less than 40° F, and
 - 2. the air temperature is not greater than 50° F for more than one-half of any 24-hr period.

The average daily air temperature is the average of the highest and the lowest temperatures occurring during the period from midnight to midnight."

- B. Concrete shall be protected from experiencing a single freezing cycle until it has attained a compressive strength of at least 1,000 psi. Concrete shall be protected from experiencing two or more freezing cycles until it has attained a compressive strength of at least 3,500 psi.

3.3 HOT WEATHER CONCRETING

- A. Concreting which occurs in hot weather shall comply with ACI 305 "Hot Weather Concreting", latest revision.
- B. In hot weather (as defined in ACI 305), the contractor shall be prepared to protect the concrete from the adverse influence of heat on the placement and curing of concrete. Special precautions shall be taken to avoid cracking of the concrete from rapid drying when air temperatures exceed 70° F. For purposes of complying with ACI 305 the critical evaporation rate shall be considered to be 0.2 lb/ft²/hr.
- C. In hot weather, slabs shall be wet cured.

3.4 SURFACE REPAIRS

- A. Remove all honeycombed and other defective concrete down to sound concrete. Dampen area to be patched and area around it to prevent absorption of water from patching mortar. Patching mixture shall be of same sand and cement as used in concrete so as to match color. Final patch shall be flush with finished surface and finished to match surrounding area.

- B. Wall ties shall be removed after form removal. Tie holes which shall be exposed shall be patched with mortar mix. Tie holes not exposed in the finished work may be filled with asphalt roofing cement, troweled into holes.

3.5 CONCRETE PENETRATIONS

- A. Holes required by various trades shall be cast with sleeves when the concrete is placed unless otherwise approved by the Engineer.
- B. Holes required by various trades, and not receiving sleeves shall be cut using a core drilling process or sawing process which produces clean, sharp edges and minimum hole size which can accommodate the required piping, conduit or equipment. Holes shall not be “broken or knocked” through.
- C. All penetrations through concrete shall be made watertight and be clean and neat in appearance.

3.6 INSTALLATION OF EMBEDDED ITEMS

- A. General: Supply and set into work, anchorage devices and other embedded items required for other work that is to be attached to, or supported by cast-in-place concrete. Do not “wet stick” embedded items during and/or after concrete placement.

3.7 ACCEPTANCE

- A. Strength: Strength of concrete shall be considered satisfactory if the average of any five consecutive strength tests of the laboratory cured specimens representing each strength of concrete is equal to or greater than the specified strength and if not more than 20 percent of the strength tests have values less than specified.
- B. Strength: If inadequate specimens are available to determine strength then at least three cores shall be taken in accordance with ASTM C42 from the area in question. The location of such cores shall be determined by the Engineer and testing shall be done by an independent testing laboratory approved by the Engineer. The strength of cores from each member or area shall be considered satisfactory if their average is equal to or greater than 90% of specified strength. The Owner shall pay for obtaining cores and testing. If the testing determines the concrete to be less than satisfactory then the Contractor shall reimburse the Owner for such coring and testing. Core holes shall be plugged solid with grout.
- C. Work that meets the applicable requirements of 3.6.A or B above shall be accepted, with regard to strength.
- D. Concrete failing to meet the strength requirements of this section may be required to undergo additional curing as specified by the Engineer or may be required to be removed, at the discretion of the Engineer.
- E. Formed surfaces that are not within tolerances specified and/or inaccurately formed surfaces exposed to view will be rejected and shall be removed and replaced.

- F. Concrete exposed to view with defects which adversely affect the appearance of the structure may be repaired if possible. If, in the opinion of the Engineer, the defects cannot be repaired, the concrete may be accepted or rejected in accordance with the decision of the Engineer.
- G. Concrete members cast in the wrong location may be rejected if the strength, appearance or function of the structure is adversely affected in the opinion of the Engineer.

END OF SECTION 03 30 00

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SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Model code evaluation reports for wood-preservative treated wood, engineered wood products and metal framing anchors.
- B. Related Work Specified Elsewhere – Related work and materials are found in the following sections:

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.
- B. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

2.2 TREATED MATERIALS

- A. Preservative-Treated Materials: Lumber treated according to AWP standard U1 (most recent) and meeting all State, Federal and local regulations.
 - 1. All pressure treated framing lumber shall be #2 and better Southern Yellow Pine.
 - 2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
 - 3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 4. All treated materials shall meet the AWP Use Category System Standard U1 for the applicable application.
 - a. Interior Plates on concrete: UC2
 - b. Exterior Posts and general framing materials: UC4A
 - c. Critical Structural members in direct contact with ground: UC4B
- B. Use preservative treated material for items indicated on Drawings, and the following:
 - 1. Wood members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Concealed members in contact with masonry or concrete.
 - 3. Wood floor plates that are installed over concrete slabs-on-grade.

- C. Fire-Retardant-Treated Materials: Comply with performance requirements in AWP A U1, Section TI C20.
 - 1. Use Exterior type for exterior locations and where indicated.
 - 2. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
 - 3. Use Interior Type A, unless otherwise indicated.
 - 4. Identify with appropriate classification marking of a testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Provide fire-retardant treated materials for items indicated on Drawings.

2.3 LUMBER

- A. Dimension Lumber:
 - 1. Maximum Moisture Content: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness
 - 2. Load-Bearing Partitions: No.1/No.2 Spruce-pine-fir: NLGA
 - 3. Non-Load-Bearing Interior Partitions: No.1/No. 2 Spruce/Pine/Fir: NELMA rated.
 - 4. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
 - a. Species: As specified for framing other than non-load bearing partitions.
 - b. Grade: **No. 1/No. 2**
- B. Exposed Boards: Mixed southern pine, No. 1: SPIB; or Hem-fir, Select Merchantable or No. 1 Common: NLGA, WCLIB, or WWP A with 15 percent maximum moisture content.
- C. Concealed Boards: Eastern softwoods, No. 3 Common: NELMA or Northern species, No. 3 Common: NLGA with 15 percent maximum moisture content.
- D. Miscellaneous Lumber: Construction, or No. 2 grade with 15 percent maximum moisture content of any species. Provide for nailers, blocking, and similar members.

2.4 ENGINEERED WOOD PRODUCTS

- A. Engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturers' published values shall be demonstrated by comprehensive testing.
- B. Laminated-Veneer Lumber: Manufactured with exterior-type adhesive complying with ASTM D 2559. Allowable design values determined according to ASTM D 5456.
 - 1. Extreme Fiber Stress in Bending, Edgewise: 2600 psi for 12-inch nominal-depth members.
 - 2. Modulus of Elasticity, Edgewise: 1,900,000 psi.

- C. Plywood and other structural wood panels shall conform to and be stamped with the American Plywood Association APA Grade trademark and meet Product Standard PS-1 or PS-2 for the panels specified.
- D. Wood I-Joists: Prefabricated units, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Provide units complying with material requirements of and with structural capacities established and monitored according to ASTM D 5055.
 - 1. Web Material: Either oriented strand board or plywood, Exposure 1
 - 2. Structural Properties: Provide units with depths and design values not less than those indicated.
 - 3. Provide units complying with APA PRI-400, factory marked with nominal joist depth, joist class, span ratings, mill identification, and compliance with APA standard.
 - 4. Basis of Design: TrusJoist TJI Joist by Weyerhaeuser

2.5 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: Plywood, Exposure 1, C-D Plugged, fire-retardant treated, not less than ¾ inch thick.

2.6 WATER-RESISTIVE BARRIER

- A. Building Wrap: Air barrier; with flame-spread and smoke-developed indexes of less than 15 and 75, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
 - 1. Products: Subject to compliance with requirements, basis of design:
 - a. Benjamin Obdyke; HydroGap Drainable Housewrap.
 - 2. Water-Vapor Permeance: Not less than 16 perms per ASTM E 96/E 96M, Desiccant Method (Procedure A).
 - 3. Air Permeance: Not more than 0.002 cfm/sq ft. (0.010 L/s x sw. m at 75 Pa) at 0.3-inch wg when tested according to ASTM E 2178.
 - 4. Allowable UV Exposure Time: Not less than three months.
- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joint and penetrations in building wrap.

2.7 MISCELLANEOUS PRODUCTS

- A. Fasteners: Size and type indicated. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
 - 1. Power-Driven Fasteners: CABO NER-272.
 - 2. Bolts: Unless otherwise noted, steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

3. Hangers and miscellaneous hardware: Unless otherwise noted, structural ties and hangers are Simpson Strong-Tie. All fasteners and hangers in contact with preservative treated materials shall be heavy galvanized steel.
 4. All structural bolts in contact with preservative treated material shall be A307 hot dipped galvanized bolts with matching washers and nuts in accordance with ASTM A153.
- B. Metal Framing Anchors: Structural capacity, type, and size indicated.
1. Use anchors made from hot-dip galvanized steel complying with ASTM A 653/A 653M, G60 coating designation for interior locations where stainless steel is not indicated.
 2. Use anchors made from stainless steel complying with ASTM A 666, Type 304 for exterior locations subject to salt water spray unless otherwise noted.
- C. Epoxy Anchoring Adhesive: two-component, high solids, epoxy-based adhesive designed for use as a non-shrink anchor grouting material. Shall meet or exceed ASTM C-881 for Type I, II, IV and V, Grade 3, Class B & C. Adhesive manufacture must specify that its setting and use is acceptable in submerged, marine environments. Basis of Design: SET High Strength Epoxy-Tie Anchoring Adhesive.
- D. Sill-Sealer: Closed-cell neoprene foam, 1/4 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All framing shall meet or exceed the requirements of IBC 2021 section 2308
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Connection of timber framing members to ledge or rock shall be done with galvanized threaded rod and epoxy adhesive. Follow manufacturers' recommendations for installation of epoxy adhesive systems.
- D. Securely attach rough carpentry to substrates and other members, complying with the following:
 1. CABO NER-272 for power-driven fasteners.
 2. Published requirements of metal framing anchor manufacturer.
 3. Table 2304.10.1, "Fastener Schedule": International Building Code (2021)
- E. Install TJI joists and rafters in accordance with manufacturer's instructions.
 1. Provide minimum bearing lengths per manufacturer.
 2. Install web stiffeners at all hanger locations unless manufacturer specifically permits omission.
 3. Install continuous rim board at all required locations and provide blocking panels, squash blocks, and bridging where required for load transfer, point loads or stability.
 4. Field modifications:

- a. Do not cut, notch or drill flanges.
- b. Web holes permitted ONLY within manufacturer's published limits

END OF SECTION 061000

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SECTION 06 16 00
SHEATHING

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Subflooring and underlayment.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for plywood backing panels.

1.2 INFORMATIONAL SUBMITTALS

- A. Product Certificates: From air-barrier and water-resistant glass-mat gypsum sheathing manufacturer, certifying compatibility of sheathing accessory materials with Project materials that connect to or that come in contact with the sheathing.
- B. Product Test Reports: For each air-barrier and water-resistant glass-mat gypsum sheathing assembly, indicating compliance with specified requirements, for tests performed by a qualified testing agency.
- C. Evaluation Reports from ICC-ES:
- D. Field quality-control reports.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of air-barrier and water-resistant glass-mat gypsum sheathing.
- B. Testing Agency Qualifications:
 1. For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
 2. For testing and inspecting agency providing tests and inspections related to air-barrier and water-resistant glass-mat gypsum sheathing: an independent agency, qualified in accordance with ASTM E329 for testing indicated, and certified by Air Barrier Association of America, Inc.

SECTION 06 16 00
SHEATHING

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- B. Factory mark panels to indicate compliance with applicable standard.

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 WALL SHEATHING

- A. Plywood Sheathing, Walls: **[DOC PS 1] [Either DOC PS 1 or DOC PS 2], [Exterior, Structural I] [Exterior] [Exposure 1, Structural I] [Exposure 1]** sheathing.
 - 1. Span Rating: Not less than **[16/0] [20/0] [24/0] [32/16]**..
 - 2. Nominal Thickness: Not less than 1/2 inch.
- B. Oriented-Strand-Board Sheathing, Walls: **DOC PS 2, [Exposure 1, Structural I] [Exposure 1]** sheathing.
 - 1. Span Rating: Not less than **[16/0] [20/0] [24/0] [24/16] [32/16]**.
 - 2. Nominal Thickness: Not less than 1/2 inch.

SECTION 06 16 00
SHEATHING

2.4 ROOF SHEATHING

- A. Plywood Sheathing, Roofs: **[DOC PS 1] [Either DOC PS 1 or DOC PS 2], [Exterior, Structural I] [Exterior] [Exposure 1, Structural I] [Exposure 1]** sheathing.
1. Span Rating: Not less than **[16/0] [20/0] [24/0] [32/16] [40/20] [48/24]**.
 2. Nominal Thickness: Not less than **[15/32 inch (11.9 mm)] [1/2 inch (13 mm)]**.
- B. Oriented-Strand-Board Sheathing, Roofs: **DOC PS 2, [Exposure 1, Structural I] [Exposure 1]** sheathing.
1. Span Rating: Not less than **[16/0] [20/0] [24/0] [24/16] [32/16] [40/20] [48/24]**.

If retaining "Nominal Thickness" Subparagraph below, usually retain first option for spans of 16 inches (406 mm) and second option for spans of 24 inches (610 mm). Retain third option for more stringent requirement.

2. Nominal Thickness: Not less than **[5/8 inch (16 mm)] [3/4 inch (19 mm)]**.

2.5 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Combination Subfloor-Underlayment: **DOC PS 1, [Exterior, Structural I, C-C Plugged] [Exterior, C-C Plugged] [Exposure 1, Structural I, Underlayment] [Exposure 1, Underlayment]** single-floor panels.
1. Span Rating: Not less than **[16] [20] [24] [32] [48]**.
 2. Nominal Thickness: Not less than 23/32 inch.
 3. Edge Detail: **[Square] [Tongue and groove]**.
 4. Surface Finish: Fully sanded face.
- B. Oriented-Strand-Board Combination Subfloor-Underlayment: **DOC PS 2, Exposure 1** single-floor panels.
1. Span Rating: Not less than **[16] [20] [24] [32] [48]**.
 2. Nominal Thickness: Not less than 23/32 inch.
 3. Edge Detail: **[Square] [Tongue and groove]**.
 4. Surface Finish: **[Fully sanded] [Resin-impregnated overlay]** face.
- C. Plywood Subflooring: **[DOC PS 1] [Either DOC PS 1 or DOC PS 2], [Exterior, Structural I] [Exterior] [Exposure 1, Structural I] [Exposure 1]** single-floor panels or sheathing.
1. Span Rating: Not less than **[16] [20] [24] [32] [48] [or] [32/16] [40/20] [48/24]**.
 2. Nominal Thickness: Not less than 23/32 inch.
- D. Oriented-Strand-Board Subflooring: **DOC PS 2, Exposure 1[, Structural I sheathing] [single-floor panels or sheathing]**.
1. Span Rating: Not less than **[16] [20] [24] [32] [48] [or] [32/16] [40/20] [48/24] [60/32]**.
 2. Nominal Thickness: Not less than **23/32 inch**.

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- E. 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. Plywood Underlayment for Resilient Flooring: DOC PS 1, [**Exterior A-C**] [**Exterior B-C**] [**Exterior, C-C Plugged**] [**Exposure 1 Underlayment**] with fully sanded face.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For [**roof**] [**parapet**] [**and**] [**wall**] sheathing, provide fasteners [**with hot-dip zinc coating complying with ASTM A153/A153M**] [**of Type 304 stainless steel**].
 - 2. For [**roof**] [**parapet**] [**and**] [**wall**] sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.
- E. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117. Provide washers or plates if recommended by sheathing manufacturer.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with [**APA AFG-01**] [**ASTM D3498**] that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

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.

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SHEATHING

- C. Securely attach to substrate by fastening as indicated, complying with the following:

Retain one of first two subparagraphs below, as required to comply with requirements of Project and local codes.

1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
 3. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF WOOD STRUCTURAL PANEL

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
1. Combination Subfloor-Underlayment:
 - a. 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. 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.
 3. Wall and Roof Sheathing:
 - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch apart at edges and ends.

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- 4. Underlayment:
 - a. Nail to subflooring.
 - b. Space panels 1/32 inch apart at edges and ends.
 - c. Fill and sand edge joints of underlayment receiving resilient flooring immediately before installing flooring.

3.3 INSTALLATION OF CEMENTITIOUS BACKER UNITS

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

3.4 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.
- B. Testing and Inspecting Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Tests: As determined by testing agency from among the following tests:
 - 1. Air-Leakage-Location Testing: Air-barrier sheathing assemblies will be tested for evidence of air leakage in accordance with ASTM E1186, chamber pressurization or depressurization with smoke tracers
 - 2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate in accordance with ASTM E783.
- D. Air barriers will be considered defective if they do not pass tests and inspections.
- E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
- F. Prepare test and inspection reports.

END OF SECTION 061600

SECTION 06 20 13
EXTERIOR FINISH CARPENTRY

SECTION 062013 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior trim.
2. Fiber-cement composite siding
3. Fiber-cement composite soffits.

1.2 DEFINITIONS

- A. MDO: Plywood with a medium-density overlay on the face.
- B. PVC: Polyvinyl chloride.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- D. Samples for Verification:
1. For fiber-cement siding and soffits, 50 sq. in. for board types and 8 by 10 inches for panels.
 2. For cellular PVC: 80 square inches for panels.

1.4 INFORMATIONAL SUBMITTALS

- A. Compliance Certificates:
1. For lumber that is not marked with grade stamp.

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EXTERIOR FINISH CARPENTRY

- 2. For preservative-treated wood that is not marked with treatment-quality mark.
- B. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.
 - 2. Cellular PVC trim.
 - 3. Fiber-Cement Trim
- C. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum of two (2) years of experience with installation of similar products.
- B. Pre-Installations Meeting(s): Prior to beginning installation, conduct conference(s) to verify coordination, site meetings, installation and project requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
 - 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 - 2. Provide for air circulation around stacks and under coverings.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.8 WARRANTY

- 1. Warranty Period for Factory-Applied Finish: Five years from date of Substantial Completion.
- 2. Warranty Period: Siding, Soffits and Trim (Excluding Finish), 25 years from date of Substantial Completion.
- 3. Warranty Period for Fiber-Cement products, 15 years minimum transferable warranty.

SECTION 06 20 13
EXTERIOR FINISH CARPENTRY

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of inspection agency, indicating grade, species, moisture content at time of surfacing, and mill.
 - 2. For exposed lumber, mark grade stamp on end or back of each piece
- B. Softwood Plywood: DOC PS 1.
- C. Hardboard: ANSI A135.4.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Water-Repellent Preservative Treatment by Nonpressure Process: AWP A N1; dip, spray, flood, or vacuum-pressure treatment.
 - 1. Preservative Chemicals: 3-iodo-2-propynyl butyl carbamate (IPBC)
 - 2. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
- B. Preservative Treatment by Pressure Process: AWP A U1; Use Category [UC3a] [UC3b].
 - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent, respectively.
 - 2. Preservative Chemicals: Acceptable to authorities having jurisdiction
 - 3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
 - 4. Do not use material that is warped or does not comply with requirements for untreated material.
 - 5. Mark lumber with treatment-quality mark of an inspection agency approved by the ALSC's Board of Review.
 - a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 - 6. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
 - a. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.

SECTION 06 20 13
EXTERIOR FINISH CARPENTRY

2.3 EXTERIOR TRIM

- A. Lumber Trim for Transparent Finish (Stain or Clear Finish):
 - 1. Species and Grade:
 - a. Eastern white cedar; NLGA, WCLIB, or WWPA
 - 2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
 - 3. Face Surface: Surfaced (smooth)
- B. Lumber Trim for Opaque Finish (Painted Finish):
 - 1. Species and Grade:
 - a. Eastern white cedar; NLGA, WCLIB, or WWPA Grade A
 - b. Eastern white pine, eastern hemlock-balsam fir-tamarack, eastern spruce, or white
 - 2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
 - 3. Face Surface: Surfaced (smooth)
 - 4. Factory Priming: Factory coated on both faces and all edges, with exterior primer compatible with topcoats specified.

2.4 FIBER-CEMENT SIDING AND TRIM

- A. Basis-of-Design: Plycem USA LLC, a.k.a Allura or approved equal.
- B. Fasteners:
 - 1. Refer to applicable building code compliance reports for fastener size specifications and selection
 - 2. Use corrosion resistant fasteners appropriate to local building codes and practices.
- C. Finishes
 - 1. Factory Primer: provide factory primed universal primer
 - 2. Factory Finish: factory applied finish, defined as a finish applied in the same facility that manufactures the substrate or a facility approved by the manufacturer.
 - 3. Protection: factory applied finish protection when palletized, such as plastic laminate or slip sheet.

2.5 CELLULAR PVC TRIM AND PANELS

- A. Cellular PVC: extruded, expanded PVC with a small microstructure, recommended by manufacturer for exterior use, made from UV-and heat stabilized rigid material.
 - 1. Density: Not less than 31 lb/cu. Ft.
 - 2. Heat Deflection Temperature: Not less than 130 deg F, in accordance with ASTM D648.
 - 3. Coefficient of Thermal Expansion: Not more than 4.5×10^{-5} inches/inch x deg F.
 - 4. Water Absorption: Not more than 1 percent, in accordance with ASTM D570.
 - 5. Flame-Spread Index: 75 or less, in accordance with ASTM E84.
 - 6. Thickness: 1 inch

SECTION 06 20 13
EXTERIOR FINISH CARPENTRY

7. Surface: Smooth

2.6 FIBER-CEMENT SOFFITS

- A. Fiber-cement soffits:
1. Thickness: 3/4" inch
 2. Style: Non-ventilated
 3. Surface: Smooth
 4. Factory primed for field finish
- B. Continuous Soffit vent: 2" wide by 3/8 inch deep aluminum vent strip
1. Basis of Design Product: Air Vent Inc SV202 or approved substitute, installed according to manufacturer's recommendations.
 - a. Net free area: 9 sq in per foot
 - b. Color: Brown

2.7 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.
1. For face-fastening siding, provide ringed-shank siding nails or hot-dip galvanized-steel siding nails unless otherwise recommended by the manufacturer.
 2. For prefinished items, provide matching prefinished aluminum fasteners where face fastening is required.
 3. For pressure-preservative-treated wood, provide stainless steel or hot-dip galvanized-steel fasteners.
 4. For applications not otherwise indicated, provide stainless steel, hot-dip galvanized-steel, or aluminum fasteners.
- B. Wood Glue: Waterproof resorcinol glue recommended by manufacturer for exterior carpentry use.
- C. Adhesive for Cellular PVC Trim: Product recommended by trim manufacturer.
- D. Flashing: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.
1. Horizontal Joint Flashing for Panel Siding: Preformed, galvanized-steel or prefinished-aluminum, Z-shaped flashing.
- E. Insect Screening for Soffit Vents: Aluminum, 18-by-16-inch black mesh PVC-coated glass-fiber black fabric, 18-by-14-inch or 18-by-16-inch mesh
- F. Sealants: Latex, complying with ASTM C834 and applicable requirements in Section 079200 "Joint Sealants," and recommended by sealant and substrate manufacturers for intended application.

SECTION 06 20 13
EXTERIOR FINISH CARPENTRY

2.8 FABRICATION

- A. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Do not begin installation until substrates have been properly prepared.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Prime lumber and moldings to be painted, including both faces and edges, unless factory primed.
 - 1. Cut to required lengths and prime ends.
 - 2. Comply with requirements in Section 099113 "Exterior Painting."

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut exterior finish carpentry to fit adjoining work.
 - 3. Refinish and seal cuts as recommended by manufacturer.
 - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 5. Coordinate exterior finish carpentry with materials and systems in or adjacent to it.

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6. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 INSTALLATION OF STANDING AND RUNNING TRIM

- A. Install flat-grain lumber with bark side exposed to weather.
- B. Install cellular PVC trim and panels to comply with manufacturer's written instructions.
- C. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary.
 1. Use scarf joints for end-to-end joints.
 2. Stagger end joints in adjacent and related members.
- D. Fit exterior joints to exclude water.
 1. Cope at returns and miter at corners to produce tight-fitting joints, with full-surface contact throughout length of joint.
 2. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
- E. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.5 INSTALLATION OF FIBER-CEMENT SIDING

- A. Install siding to comply with manufacturer's written instructions and warranty requirements.
- B. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- C. Align vertical joints over framing members.
- D. All minimum 1/8 inch minimum gap between trim and siding. Seal gap with high quality, paintable caulk.
- E. Place fasteners no closer than 3/8 inch from edges of panels.
- F. Flashing: Install metal flashing as indicated on Drawings and as recommended by siding manufacturer. Provide drip cap flashing over windows and doors, at top of panels and trip, at horizontal joints in panel siding and at horizontal trim to siding joints. Provide full length pieces without lap splices to the maximum extent possible. For runs requiring splices, set vertical and horizontal legs of lap in sealant. Allow 1/8 inch caulk space between edge of siding and flashing.
- G. Finish: Apply finish within two weeks of installation.

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- H. All field cuts shall be sealed with coat of finish before installation. Allow coating to dry before caulking.

3.6 ADJUSTING

- A. Replace exterior finish carpentry that is damaged or does not comply with requirements.
 - 1. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

3.7 CLEANING

- A. Clean exterior finish carpentry on exposed and semi exposed surfaces.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.

3.8 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.9 WASTE MANAGEMENT

- A. Separate wood waste in accordance with the Waste Management Plan.
- B. Separate the following categories for salvage or reuse on site:
 - 1. Sheet materials larger than 2 square feet
 - 2. Framing members longer than 16 inches
 - 3. Multiple cutoffs of any size larger than 12 inches
- C. Recycle the following categories:
 - 1. Clean, unpainted engineered wood products
 - 2. Clean, unpainted dimensional lumber
- D. Separate the following categories for disposal and place in designated areas for hazardous materials:
 - 1. Treated, stained, painted or contaminated wood.

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- E. Close and seal tightly all partly used adhesive containers and store protected in well-ventilated, fire-safe area at moderate temperatures.
- F. Place used adhesive tubes and containers in areas designated for hazardous materials.

END OF SECTION 062013

SECTION 06 20 23
INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior trim.
2. Paneling.
3. Shelving and clothes rods.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view
2. Section 064023 "Interior Architectural Woodwork" for shop-fabricated carpentry.
3. Section 099123 "Interior Painting" for priming and backpriming of interior finish carpentry.

1.2 DEFINITIONS

- A. MDF: Medium-density fiberboard.
- B. MDO: Plywood with a medium-density overlay on the face.
- C. PVC: Polyvinyl chloride.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Interior trim.
2. Paneling.

B. Product Data Submittals: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

C. Samples: For each exposed product and for each color and texture specified.

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- D. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- E. Samples for Verification:
 - 1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 50 sq. in. for lumber and 8 by 10 inches for panels.
 - 2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 by 10 inches for panels.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
 - 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 - 2. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.

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2. For exposed lumber, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency

- B. Softwood Plywood: DOC PS 1.
- C. Hardboard: ANSI A135.4.
- D. MDF: ANSI A208.2, Grade MD
- E. Particleboard: ANSI A208.1, Grade M-2.

2.2 INTERIOR TRIM

- A. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
 1. Species and Grade:
 - a. Eastern white pine; NeLMA or NLGA Premium or 2 Common.
 2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
 3. Face Surface: Surfaced smooth
- B. Lumber Trim for Opaque Finish (Painted Finish):
 1. Species and Grade:
 - a. Eastern white pine; NeLMA or NLGA Finish or 1 Common
 2. Maximum Moisture Content for Softwoods: 15 percent with at least 85 percent of shipment at 12 percent or less

2.3 PANELING

- A. Hardwood Veneer Plywood Paneling: Manufacturer's stock hardwood plywood panels complying with HPVA HP-1.
 1. Face Veneer Species and Cut: Rotary-cut white birch
 2. Veneer Matching: Selected for similar color and grain.
 3. Backing Veneer Species: Same species as face veneer
 4. Construction: Veneer core.
 5. Thickness: 1/8 inch
 6. Panel Size:
 - a. 48 by 96 inches or 48 by 120 inches
 7. Glue Bond: Type II (interior).
 8. Face Pattern: Manufacturer's standard V channel-grooved pattern, with grooves at edges, center, and third points of panels, and at other locations to provide pattern resembling random-width boards.
 9. Finish: As selected by Architect from manufacturer's full range.

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2.4 SHELIVING AND CLOTHES RODS

- A. Shelving: Exposed shelving, made from the one following material 3/4 inch thick:
 - 1. MDF with solid-wood front edge.
 - 2. MDO softwood plywood with solid-wood edge.
 - 3. Softwood Boards:
- B. Shelf Cleats: boards sized as noted in drawings with hole and notch to receive clothes rods, as specified above for shelving
- C. Shelf Brackets with Rod Support: BHMA A156.16, B04051; prime-painted formed steel.
- D. Standards for Adjustable Shelf Brackets: BHMA A156.9, B04102; powder-coat-finished steel.
- E. Adjustable Shelf Brackets: BHMA A156.9, B04112; powder-coat-finished steel.
- F. Standards for Adjustable Shelf Supports: BHMA A156.9, B04071; powder-coat-finished.
- G. Wood Clothes Rods: 1-1/2-inch- diameter, clear, kiln-dried hardwood
- H. Wood Rod Flanges: Clear, kiln-dried, Douglas fir or southern pine with clear finish.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- C. Installation Adhesive for Foam-Plastic Moldings: Product recommended for indicated use by foam-plastic molding manufacturer.
- D. Paneling Adhesive: Comply with paneling manufacturer's written instructions for adhesives.
- E. Multipurpose Construction Adhesive: Formulation, complying with ASTM D3498, that is recommended for indicated use by adhesive manufacturer.

2.6 FABRICATION

- A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
 - 1. Interior standing and running trim, except shoe and crown molds.
 - 2. Wood-board paneling.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

SECTION 06 20 23
INTERIOR FINISH CARPENTRY

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 INSTALLATION OF INTERIOR TRIM

- A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
 - 1. Do not use pieces less than 24 inches long, except where necessary.
 - 2. Stagger joints in adjacent and related standing and running trim.

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3. [Cope] [Miter] at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
4. Use scarf joints for end-to-end joints.
5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
7. Install trim after gypsum-board joint finishing operations are completed.
8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
9. Fasten to prevent movement or warping.
10. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 INSTALLATION OF PANELING

- A. Plywood Paneling: Select and arrange panels on each wall to minimize noticeable variations in grain character and color between adjacent panels.
1. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings.
 2. Install with uniform tight joints between panels.
 3. Attach panels to supports with manufacturer's recommended panel adhesive and fasteners.
 4. Space fasteners and adhesive as recommended by panel manufacturer.
 5. Conceal fasteners to greatest practical extent.
 6. Arrange panels with grooves and joints over supports.
 - a. Fasten to supports with nails of type and at spacing recommended by panel manufacturer.
 - b. Use fasteners with prefinished heads matching groove color.
- B. Hardboard Paneling: Install according to manufacturer's written instructions.
1. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings.
 2. Butt adjacent panels with moderate contact.
 3. Use fasteners with prefinished heads matching paneling color.
 4. Wood Stud or Furring Substrate: Install with 1-inch annular-ring shank hardboard nails.
 5. Plaster or Gypsum-Board Substrate: Install with 1-5/8-inch annular-ring shank hardboard nails.
 6. Nailing: Space nails 4 inches o.c. at panel perimeter and 8 inches o.c. at intermediate supports unless otherwise required by manufacturer.
- C. Board Paneling: Install according to manufacturer's written instructions.
1. Arrange in random-width pattern suggested by manufacturer unless boards or planks are of uniform width.
 2. Install in full lengths without end joints.
 3. Stagger end joints in random pattern to uniformly distribute joints on each wall.
 4. Install with uniform end joints. Locate end joints only over furring or blocking.
 5. Select and arrange boards on each wall to minimize noticeable variations in grain character and color between adjacent boards.

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6. Install with uniform tight joints between boards.
7. Fasten paneling with trim screws, set below face and filled.

3.6 INSTALLATION OF SHELVING AND CLOTHES RODS

- A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth.
 1. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled.
 2. Space fasteners not more than 16 inches o.c. Use two fasteners at each framing member or fastener location for cleats 4 inches nominal (89 mm actual) in width and wider.
 3. Apply a bead of multipurpose construction adhesive to back of shelf cleats before installing.
 4. Remove adhesive that is squeezed out after fastening shelf cleats in place.
- B. Install shelf brackets according to manufacturer's written instructions, spaced not more than 32 inches o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
- C. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners not more than 12 inches o.c.
- D. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches o.c. and within 6 inches of ends of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
- E. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled.
 1. Install shelves, fully seated on cleats, brackets, and supports.
 2. Fasten shelves to cleats with finish nails or trim screws, set flush.
 3. Fasten shelves to brackets to comply with bracket manufacturer's written instructions.
- F. Install rod flanges for rods as indicated.
 1. Fasten to shelf cleats, framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
 2. Install rods in rod flanges.

3.7 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements.
 1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

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3.8 CLEANING

- A. Clean interior finish carpentry on exposed and semiexposed surfaces.
- B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.9 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062023

SECTION 07 11 13
BITUMINOUS DAMPPROOFING

SECTION 071113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold-applied, emulsified-asphalt dampproofing.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for bituminous vapor retarders under slabs-on-grade.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

- B. Material Certificates: For each product, signed by the manufacturer.

1.3 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.

- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide auxiliary materials recommended in writing by manufacturer of primary materials.

2.2 PERFORMANCE REQUIREMENTS

- A. VOC Content: Products are to comply with VOC content limits of authorities having jurisdiction unless otherwise indicated.

SECTION 07 11 13
BITUMINOUS DAMPPROOFING

2.3 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Degussa Building Systems, Sonneborn Brand Products
 - 2. Karnak Corporation
 - 3. Meadows, W.R., Inc.
- B. Trowel Coats: ASTM D1227, Type II, Class 1.
- C. Fibered Brush and Spray Coats: ASTM D1227, Type II, Class 1.
- D. Brush and Spray Coats: ASTM D1227, Type III, Class 1.
- E. VOC Content: 0.25 lb/gal. or less.

2.4 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Emulsified-Asphalt Primer: ASTM D1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- C. Asphalt-Coated Glass Fabric: ASTM D1668/D1668M, Type I.
- D. Patching Compound: of type recommended in writing by dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for surface smoothness, maximum surface moisture content, and other conditions affecting performance of the Work.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for dampproofing application.
- B. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

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- C. Clean substrates of projections and substances detrimental to dampproofing work; fill voids, seal joints, and remove bond breakers if any.
- D. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections.

3.3 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless otherwise indicated.
 - 1. Apply dampproofing to provide continuous plane of protection.
 - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.
 - 1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where indicated as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.
- C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
 - 1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
 - 2. Lap dampproofing at least 1/4 inch onto shelf angles supporting veneer.

3.4 INSTALLATION OF COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Concrete Foundations and Parged Masonry Foundation Walls: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 3 gal./100 sq. ft. for second coat; or one trowel coat not less than 4 gal/100 sq. ft.
- B. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft..

3.5 PROTECTION

- A. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where panels are

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BITUMINOUS DAMPPROOFING

subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

- B. Correct dampproofing that does not comply with requirements; repair substrates, and reapply dampproofing.

END OF SECTION 071113

SECTION 07 13 26
SELF-ADHERING SHEET WATERPROOFING

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Samples: For the following products:
 - 1. 12-by-12-inch (300-by-300-mm) square of waterproofing and flashing sheet.
 - 2. 4-by-4-inch (100-by-100-mm) square of drainage panel.
- C. Qualification Data: For Installer.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for waterproofing.
- E. Warranties: Special warranties specified in this Section.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that is approved or licensed by waterproofing manufacturer for installation of waterproofing required for this Project.
- B. Source Limitations: Obtain waterproofing materials and molded-sheet drainage panels through one source from a single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.

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SELF-ADHERING SHEET WATERPROOFING

- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Store rolls according to manufacturer's written instructions.
- E. Protect stored materials from direct sunlight.

1.5 PROJECT CONDITIONS

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

1.6 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 inch (1.6 mm) in width.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET WATERPROOFING

- A. Modified Bituminous Sheet Waterproofing: Not less than 60-mil- (1.5-mm-) thick, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated to a 4-mil- (0.10-mm-) thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
 - b. Grace, W. R. & Co.; Bituthene 3000.
 - 2. Physical Properties:
 - a. Tensile Strength: 250 psi (1.7 MPa) minimum; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D 1970.

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SELF-ADHERING SHEET WATERPROOFING

- d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
 - e. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E 154.
 - f. Hydrostatic-Head Resistance: 200 feet (45 m) minimum; ASTM D 5385.
 - g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.
 - h. Water Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m) maximum; ASTM E 96, Water Method.
3. Sheet Strips: Self-Adhering, rubberized asphalt strips of same material and thickness as sheet waterproofing

2.2 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid primer recommended for substrate by manufacturer of sheet waterproofing material.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
- F. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.
- G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

2.3 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side with or without a polymeric film bonded to the other side of a studded, non-biodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 16 gpm per ft. (112 to 188 L/min. per m).

PART 3 - EXECUTION

3.1 EXAMINATION

SECTION 07 13 26
SELF-ADHERING SHEET WATERPROOFING

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

3.2 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
 - 1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch (1.6 mm).
- F. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.
 - b. At plaza deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.
- G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 MODIFIED BITUMINOUS SHEET WATERPROOFING APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Re-prime areas exposed for more than 24 hours.

SECTION 07 13 26
SELF-ADHERING SHEET WATERPROOFING

- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F (16 deg C).
- D. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.
- E. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
- F. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic.
- G. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
- H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.
- I. Install protection course with butted joints over waterproofing membrane immediately.
 - 1. Molded-sheet drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.
- J. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

3.4 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - 1. For vertical applications, install board insulation before installing drainage panels.

3.5 PROTECTION AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 0713126

SECTION 07 21 00
THERMAL INSULATION

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Extruded polystyrene foam-plastic board insulation.
 - 2. Glass-fiber blanket insulation.
 - 3. Mineral-wool blanket insulation.

1.2 ACTION SUBMITTALS

- A. Product Data:
 - 1. Extruded polystyrene foam-plastic board insulation.
 - 2. Glass-fiber blanket insulation.
 - 3. Mineral-wool blanket insulation.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Research Reports: For foam-plastic insulation, from ICC-ES.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

SECTION 07 21 00
THERMAL INSULATION

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes less than 25 and 450 when tested in accordance with ASTM E84.
- B. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.
- C. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- D. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- E. Thermal-Resistance Value (R-Value): R-value as indicated on Drawings in accordance with ASTM C518.

2.2 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD INSULATION

- A. Extruded Polystyrene Board Insulation, Type IV: ASTM C578, Type IV, 25-psi minimum compressive strength; unfaced.
 - 1. Available Products:
 - a. Foamular 250; Owens Corning.
 - b. Styrofoam; Dow Chemical
 - c. Or approved equal.

2.3 GLASS-FIBER BLANKET INSULATION

- A. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I; passing ASTM D126 for combustion characteristics
 - 1. Available Products:
 - a. CertainTeed Corporation
 - b. Guardian Fiberglass, Inc
 - c. Johns Manville Corporation
 - d. Owens Corning
 - e. Or approved equal.

2.4 MINERAL-WOOL BLANKET INSULATION

- A. Mineral-Wool Blanket Insulation, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.
 - 1. Available Products:
 - a. ComfortBatt; Rockwool

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THERMAL INSULATION

- b. TempControl; Johns Manville
- c. ThermaFiber; Owens Corning
- d. Or approved equal.

2.5 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. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 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.

3.3 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.

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THERMAL INSULATION

1. If not otherwise indicated, extend insulation a minimum of 48 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 48 inches in from exterior walls.

3.4 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 as follows:
 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions.
 2. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application.
 3. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
 4. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
 5. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
- C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.5 INSTALLATION OF CAVITY-WALL INSULATION

- A. Mineral-Wool Board Insulation: Install insulation fasteners 4 inches from each corner of board insulation, at center of board, and as recommended by manufacturer.
 1. Fit courses of insulation between obstructions, with edges butted tightly in both directions, and with faces flush.
 2. Press units firmly against inside substrates.

3.6 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.

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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 wood-framed construction, install blankets in accordance with 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.
 6. 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.

3.7 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.
- B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 07 21 19
FOAMED-IN-PLACE INSULATION

SECTION 072119 - FOAMED-IN-PLACE INSULATION

1.1 SUMMARY

A. Section Includes:

1. Closed-cell spray polyurethane foam insulation.
2. Accessories.

B. Related Requirements:

1. Section 072100 "Thermal Insulation" for foam-plastic board insulation.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Closed-cell spray polyurethane foam insulation.
2. Accessories.

B. Sustainable Design Submittals:

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by qualified testing agency.

B. Qualification Statements: For Installer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM INSULATION

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. 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.

SECTION 07 21 19
FOAMED-IN-PLACE INSULATION

2.2 ACCESSORIES

- A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.
- B. Thermal Barrier: Material barrier intended to prevent flame-source access to foam and delay temperature-rise of foam during a fire event.
 - 1. Gypsum Wallboard: 0.5-inch minimum thickness.
 - 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: 50 or less.
- C. Ignition Barrier: Material providing a 15-minute minimum fire-ignition barrier.
 - 1. Gypsum Wallboard: 0.325-inch minimum thickness.
 - 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: 50 or less.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.
- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.
- D. Framed Construction: Install into cavities formed by framing members to achieve thickness indicated on Drawings.
- E. Miscellaneous Voids: Apply according to manufacturer's written instructions.

SECTION 07 21 19
FOAMED-IN-PLACE INSULATION

- F. Install thermal and ignition barrier material.
 - 1. Do not cover insulation prior to any required spray foam insulation inspections.
- G. Apply barrier coatings in accordance with manufacturer's written instructions and to comply with requirements for listing and labeling for fire-propagation characteristics and surface-burning characteristics specified.
 - 1. Use equipment and techniques best suited for substrate and type of material applied as recommended by coating manufacturer.
 - 2. Apply coatings to prepared surfaces as soon as practical after preparation and before subsequent surface soiling or deterioration.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect spray foam insulation installation, including accessories. Report results in writing.

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 072119

SECTION 07 25 00
WEATHER BARRIERS

SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Building wrap.
 - 2. Drainage wrap.
 - 3. Flexible flashing.
 - 4. Drainage material.

1.2 ACTION SUBMITTALS

- A. Product Data:
 - 1. Building wrap.
 - 2. Drainage wrap.
 - 3. Flexible flashing.
 - 4. Drainage material.
- B. Product Data Submittals: For building wrap and drainage wrap, include data on air and water-vapor permeance based on testing in accordance with referenced standards.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

- A. Building Wrap: ASTM E2556/E2556M, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized; and acceptable to authorities having jurisdiction.
 - 1. Water-Vapor Permeance: Minimum 20 perms per ASTM E96/E96M, Desiccant Method (Procedure A).
 - 2. Air Permeance: Maximum 0.004 cfm/sq. ft. at 0.3-inch wg when tested in accordance with ASTM E2178.
 - 3. Allowable UV Exposure Time: Not more than 120 days.
- B. Drainage Wrap: ASTM E2556/E2556M, Type I dimensional water-resistive barrier that also creates a drainage plane; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; and acceptable to authorities having jurisdiction.

SECTION 07 25 00
WEATHER BARRIERS

1. Water-Vapor Permeance: Minimum 35 perms per ASTM E96/E96M, Desiccant Method (Procedure A).
 2. Air Permeance: Maximum 0.004 cfm/sq. ft. at 0.3-inch wg when tested in accordance with ASTM E2178.
 3. Drainage: Not less than 95 percent when tested in accordance with ASTM E2273.
 4. Allowable UV Exposure Time: Not more than 120 days.
- C. Acrylic Seam Tape: Composite tape consisting of a pressure-sensitive acrylic adhesive, bonded to a polyethylene or polypropylene film for sealing joints and penetrations in building wrap. Provide tape from same manufacturer as approved wrap product.

2.2 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.
- B. Rubberized-Asphalt Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
- C. Primer for Flexible Flashing: Product recommended in writing by flexible flashing manufacturer for substrate.
- D. Nails and Staples: Product recommended in writing by flexible flashing manufacturer and complying with ASTM F1667.

2.3 DRAINAGE MATERIAL

- A. Rainscreen Drainage Mat: Free-draining polymer-strand mesh sheets or strips with thickness not less than 3/4 inch and installed to full height of cavity, with additional strips 4 inches high above flashing locations and thick enough to fill entire depth of cavity to maintain a continuous open space behind exterior cladding.
 1. Available Products:
 - a. Cedarbreather, Benjamin Updyke, Inc.
 - b. E-Screen, ClarkDietrich
 - c. Mortair Vent, Mortair Inc.
 - d. Or Approved Equal.
 2. Location: As indicated on drawings
- B. Drainage Accessories: Furring strips installed between water-resistive barrier and exterior cladding to create a continuous open space behind exterior cladding.

SECTION 07 25 00
WEATHER BARRIERS

PART 3 - EXECUTION

3.1 INSTALLATION OF WATER-RESISTIVE BARRIER

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
 - 1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.
- C. Building Wrap or Drainage Wrap: Comply with manufacturer's written instructions and warranty requirements.
 - 1. Seal seams, edges, fasteners, and penetrations with tape.
 - 2. Extend into jambs of openings and seal corners with tape.

3.2 INSTALLATION OF FLEXIBLE FLASHING

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
 - 1. Prime substrates as recommended by flashing manufacturer.
 - 2. 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.
 - 3. Lap flashing over water-resistive barrier at bottom and sides of openings.
 - 4. Lap water-resistive barrier over flashing at heads of openings.
 - 5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

3.3 INSTALLATION OF DRAINAGE MATERIAL

- A. Install drainage material over building wrap and flashing to comply with manufacturer's written instructions.

END OF SECTION 072500

SECTION 07 26 00
VAPOR RETARDERS

SECTION 072600 – VAPOR RETARDERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Polyethylene vapor retarders.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for under-slab vapor retarders.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Polyethylene vapor retarders.
2. Reinforced-polyethylene vapor retarders.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

PART 2 - PRODUCTS

2.1 POLYETHYLENE VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D4397, 6-mil- thick sheet, with maximum permeance rating of 0.1 perm.

2.2 ACCESSORIES

- A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- B. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.
- C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

SECTION 07 26 00
VAPOR RETARDERS

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.2 INSTALLATION OF VAPOR RETARDERS ON FRAMING

- A. Place vapor retarders on side of construction indicated on Drawings.
- B. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- C. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs and sealing with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.
- D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- E. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.3 PROTECTION

- A. Protect vapor retarders from damage until concealed by permanent construction.

END OF SECTION 072600

SECTION 07 31 13
ASPHALT SHINGLES

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass-fiber-reinforced asphalt shingles.
2. Underlayment materials.
3. Ridge vents.
4. Metal flashing and trim.

1.2 DEFINITIONS

- A. Roofing Terminology: See ASTM D1079 for definitions of terms related to roofing Work in this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Asphalt shingles.
2. Underlayment materials.
3. Ridge vents.
4. Asphalt roofing cement.
5. Elastomeric flashing sealant.

B. Samples: For each exposed product and for each color and blend specified, in sizes indicated.

1. Asphalt Shingles: Full size.
2. Ridge and Hip Cap Shingles: Full size.
3. Ridge Vent: 12-inch long Sample.
4. Exposed Valley Lining: 12 inches square.

C. Samples for Initial Selection:

1. For each type of asphalt shingle indicated.
2. For each type of accessory involving color selection.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of asphalt shingle and underlayment product indicated, for tests performed by manufacturer and witnessed by a qualified testing agency or performed by a qualified testing agency.

SECTION 07 31 13
ASPHALT SHINGLES

Retain "Research Reports" Paragraph below for synthetic underlayment.

- B. Research Reports: For synthetic underlayment, from ICC-ES indicating that product is suitable for intended use under applicable building codes.
- C. Sample Warranty: For manufacturer's materials warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For asphalt shingles to include in maintenance manuals.
- B. Materials warranties.
- C. Roofing Installer's warranty.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Asphalt Shingles: 100 sq. ft. of each type and in each color and blend, in unbroken bundles.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture in accordance with manufacturer's written instructions.
- B. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double-stack rolls.
- C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing Work is not in progress.
- D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with installation only when existing and forecasted weather conditions permit product installation and related Work to be performed in accordance with manufacturer's written instructions and warranty requirements.

SECTION 07 31 13
ASPHALT SHINGLES

1. Install self-adhering, polymer-modified bitumen sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.10 WARRANTY

- A. Materials Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.
 2. Materials Warranty Period: 30 years from date of Substantial Completion.
 3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 110 mph for 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each type of product from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
- B. Wind Resistance: Provide asphalt shingles that comply with requirements of ASTM D3161/D3161M, Class F, and with ASTM D7158/D7158M, Class H.

2.3 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminated-Strip Asphalt Shingles: ASTM D3462/D3462M, laminated, multi-ply overlay construction; glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
 1. Available Products:
 - a. CertainTeed Corporation: Landmark
 - b. Owens-Corning Fiberglass Co; Duration
 - c. IKO Manufacturing Inc; Cambridge 30
 - d. GAF, Inc; Slateline
 - e. Or Approved Equal
 2. Butt Edge: Straight
 3. Strip Size: Manufacturer's standard
 4. Color and Blends: As selected by Architect from manufacturer's full range.
- B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles

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2.4 UNDERLAYMENT MATERIALS

- A. Organic Felt: Asphalt-saturated organic felts, nonperforated and complying with the following:
 - 1. ASTM D226/D226M: Type II
 - 2. ASTM D4869/D4869M: Type II
- B. Glass-Reinforced Felt: ASTM D6757/D6757M, asphalt-saturated, glass-reinforced organic felt or inorganic fiber-based felt.
- C. Synthetic Underlayment: UV-resistant polypropylene, polyolefin, or polyethylene polymer fabric with surface coatings or treatments to improve traction underfoot and abrasion resistance; evaluated and documented to be suitable for use as a roof underlayment under applicable codes by a testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Self-Adhering, Polymer-Modified Bitumen Sheet: ASTM D1970/D1970M, minimum 50-mil-thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-resistant top surface and release backing; cold applied.
 - 1. Top Surface: Textured polymer film

2.5 RIDGE VENTS

- A. Rigid Ridge Vent: Manufacturer's standard, rigid-section, high-density, UV-stabilized plastic ridge vent for use under ridge shingles.

2.6 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D4586/D4586M Type II, asbestos free.
- B. Elastomeric Flashing Sealant: ASTM C920, Type S, Grade NS, one-part, non-sag, elastomeric polymer sealant; of class and use classifications required to seal joints and remain watertight; recommended in writing by manufacturer for installation of flashing systems.
- C. Roofing Nails: ASTM F1667, aluminum, stainless steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- diameter, sharp-pointed, with a 3/8- to 7/16-inch-diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through sheathing less than 3/4 inch thick.
 - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- D. Underlayment Nails: Aluminum, stainless steel, or hot-dip galvanized-steel wire nails with low-profile metal or plastic caps, 1-inch- minimum diameter.
 - 1. Provide with minimum 0.0134-inch- thick metal cap, 0.010-inch- thick power-driven metal cap, or 0.035-inch- thick plastic cap; and with minimum 0.083-inch- thick ring shank or 0.091-inch- thick smooth shank of length to penetrate at least 3/4 inch into roof sheathing or to penetrate through roof sheathing less than 3/4 inch thick.

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2.7 METAL FLASHING AND TRIM

- A. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
 - 1. Sheet Metal: Anodized aluminum or Aluminum, mill finished
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item unless otherwise specified in this Section or indicated on Drawings.
 - 1. Apron Flashings: Fabricate with lower flange a minimum of 4 inches over and 4 inches beyond each side of downslope asphalt shingles and 6 inches up the vertical surface.
 - 2. Step Flashings: Fabricate with a headlap of 2 inches and a minimum extension of 4 inches over the underlying asphalt shingle and up the vertical surface.
 - 3. Cricket and Backer Flashings: Fabricate with concealed flange extending a minimum of 18 inches beneath upslope asphalt shingles and 6 inches beyond each side and 6 inches above the roof plane.
 - 4. Counterflashings: Fabricate to cover 4 inches of base flashing measured vertically; and in lengths required so that no step exceeds 8 inches and overall length is no more than 10 feet.
 - a. Provide metal reglets for installation.
 - 5. Open-Valley Flashings: Fabricate from metal sheet not less than 24 inches wide in lengths not exceeding 10 feet with 1-inch- high, inverted-V profile water diverter at center of valley and equal flange widths of not less than 11 inches.
 - a. Hem flange edges for fastening with metal cleats.
 - b. Add stiffening ribs in flashings to promote drainage.
 - 6. Drip Edges: Fabricate in lengths not exceeding 10 feet with minimum 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
 - 7. Vent-Pipe Flashings: ASTM B749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provisions have been made for flashings and penetrations through asphalt shingles.

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3. Verify that vent stacks and other penetrations through roofing are installed and securely fastened.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT MATERIALS

- A. Comply with asphalt shingle and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.
- B. Asphalt-Saturated Felt: Install on roof deck parallel with and starting at eaves and fasten with underlayment nails.
 1. Single-Layer Installation:
 - a. Lap sides a minimum of 4 inches over underlying course.
 - b. Lap ends a minimum of 4 inches.
 - c. Stagger end laps between succeeding courses at least 72 inches.
 2. Install felt underlayment on roof deck not covered by self-adhering, polymer-modified bitumen sheet unless otherwise specified in this Section or indicated on Drawings.
 - a. Lap sides of felt over self-adhering sheet not less than 4 inches in direction that sheds water.
 - b. Lap ends of felt not less than 6 inches over self-adhering sheet.
 3. Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.
 4. Terminate felt extended up not less than 4 inches against sidewalls, curbs, chimneys, and other roof projections.
- C. Synthetic Underlayment:
 1. Install on roof deck parallel with and starting at the eaves.
 - a. Lap sides and ends as recommended in writing by manufacturer, but not less than 2 inches for side laps and 6 inches for end laps.
 - b. Stagger end laps between succeeding courses at interval recommended in writing by manufacturer, but not less than 72 inches.
 - c. Fasten with underlayment nails in accordance with manufacturer's written instructions.
 - d. Cover underlayment within period recommended in writing by manufacturer.
 2. Install in single layer on roofs sloped at 4:12 and greater.
 3. Install in double layer on roofs sloped at less than 4:12.

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4. Install synthetic underlayment on roof deck not covered by self-adhering, polymer-modified bitumen sheet unless otherwise specified in this Section or indicated on Drawings.
 - a. Lap sides of underlayment over self-adhering sheet not less than 4 inches in direction to shed water.
 - b. Lap ends of underlayment not less than 6 inches over self-adhering sheet.
5. Install fasteners in a grid pattern of 12 inches between side laps with 6-inch spacing at side and end laps.
6. Terminate synthetic underlayment extended up not less than 4 inches against sidewalls, curbs, chimneys, and other roof projections.

3.3 INSTALLATION OF METAL FLASHING AND TRIM

- A. Install metal flashings and trim to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."
 1. Install metal flashings in accordance with recommendations in ARMA's "Asphalt Roofing Residential Manual - Design and Application Methods" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
 2. Bed flanges of metal flashings using asphalt roofing cement or elastomeric flashing sealant.
- B. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.
- C. Step Flashings: Install with a headlap of 2 inches and extend over underlying shingle and up the vertical face.
 1. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying shingle.
 2. Fasten to roof deck only.
- D. Cricket and Backer Flashings: Install against roof-penetrating elements extending concealed flange beneath upslope asphalt shingles and beyond each side.
- E. Counterflashings: Coordinate with installation of base flashing and fit tightly to base flashing. Lap joints a minimum of 4 inches secured in a waterproof manner.
 1. Install in reglets or receivers.
- F. Open-Valley Flashings: Install centered in valleys, lapping ends at least 8 inches in direction that sheds water. Fasten upper end of each length to roof deck beneath overlap.
 1. Secure hemmed flange edges into metal cleats spaced 12 inches apart and fastened to roof deck.
 2. Adhere minimum 9-inch- wide strips of self-adhering, polymer-modified bitumen sheet to metal flanges and to underlying self-adhering sheet, polymer-modified bitumen sheet.

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- a. Place strips parallel to and over flanges so that they will be just concealed by installed shingles.
- 3. Provide a closure at the end of the inverted-V profile of the valley metal to minimize water and ice infiltration.
- G. Rake Drip Edges: Install over underlayment materials and fasten to roof deck.
- H. Eave Drip Edges: Install below underlayment materials and fasten to roof deck.
- I. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 INSTALLATION OF ASPHALT SHINGLES

- A. Install asphalt shingles in accordance with manufacturer's written instructions and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip at least 7 inches wide with self-sealing strip face up at roof edge.
 - 1. Extend asphalt shingles 1/2 inch over fasciae at eaves and rakes.
 - 2. Install starter strip along rake edge.
- C. Install first and remaining courses of laminated asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install first and remaining courses of three-tab-strip asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

The IBC and the IRC both require fastening asphalt shingles with the minimum number of fasteners required by manufacturer, but not less than four fasteners per shingle strip. Some asphalt shingles require five fasteners per shingle strip. Six fasteners are typically required per shingle strip to resist high wind speeds. Verify fastening requirements for products specified, for design wind speeds in Project's location, and of authorities having jurisdiction. Usually indicate design wind speeds on Drawings with design wind forces determined by Project's structural engineer.

- E. Fasten asphalt shingle strips with a minimum of six roofing nails, but not less than the number indicated in manufacturer's written instructions for roof slope and design wind speed indicated on Drawings and for warranty requirements specified in this Section.
 - 1. Locate fasteners in accordance with manufacturer's written instructions.
 - 2. Where roof slope is less than 4:12, hand seal self-sealing asphalt shingles to improve the shingles' positive bond by applying asphalt roofing cement spots between course overlaps after nailing the upper course.
 - 3. When ambient temperature during installation is below 50 deg F hand seal self-sealing asphalt shingles by applying asphalt roofing cement spots between course overlaps after nailing the upper course.

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ASPHALT SHINGLES

- F. Woven Valleys: Extend succeeding asphalt shingle courses from both sides of valley **12 inches** beyond center of valley, weaving intersecting shingle-strip courses over each other. Use one-piece shingle strips without joints in valley.
 - 1. Do not nail asphalt shingles within 6 inches of valley center.
- G. Ridge Vents: Install continuous ridge vents over asphalt shingles in accordance with manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.
- H. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing-shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds.
 - 1. Fasten with roofing nails of sufficient length to penetrate sheathing.
 - 2. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.5 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS **<Insert name>** of **<Insert address>**, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:
 - 1. Owner: **<Insert name of Owner>**.
 - 2. Owner Address: **<Insert address>**.
 - 3. Building Name/Type: **<Insert information>**.
 - 4. Building Address: **<Insert address>**.
 - 5. Area of the Work: **<Insert information>**.
 - 6. Acceptance Date: **<Insert date>**.
 - 7. Warranty Period: **<Insert time>**.
 - 8. Expiration Date: **<Insert date>**.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that, during Warranty Period, Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
 - 1. Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Peak gust wind speed exceeding **<Insert wind speed>** mph;
 - c. Fire;
 - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;

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- e. Faulty construction of copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. Vapor condensation on bottom of roofing; and
 - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
- 2. When the work has been damaged by any of foregoing causes, Warranty is to be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 - 3. Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.
 - 4. During Warranty Period, if Owner allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty becomes null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Owner engages Roofing Installer to perform the alterations, Warranty does not become null and void unless Roofing Installer, before starting the alterations, notified Owner in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.
 - 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty becomes null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.
 - 6. Owner promptly notifies Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and affords reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.
 - 7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and does not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty does not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this **<Insert day>** day of **<Insert month>**, **<Insert year>**.

- 1. Authorized Signature: **<Insert signature>**.
- 2. Name: **<Insert name>**.
- 3. Title: **<Insert title>**.

END OF SECTION 073113

SECTION 76 46 24
WOOD SHINGLE AND SHAKE SIDING

SECTION 074624 - WOOD SHINGLE AND SHAKE SIDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Undercoursing.
2. Wood shingle siding.

B. Related Requirements:

1. Section 062013 "Exterior Finish Carpentry" for wood exterior-wall trim.
2. Section 072500 "Weather Barriers" for weather-resistive barriers and flexible flashing.
3. Section 076200 "Sheet Metal Flashing and Trim" for metal flashing and trim installed with siding.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Undercoursing.
2. Wood shingle siding.

- B. Samples for Initial Selection: For each type of siding product with factory-applied finishes.

- C. Samples for Verification: For the following products, of sizes indicated, to verify color and finish selected.

1. Wood Shingles: Full-size unit.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Statements: For Installer.

- B. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For siding to include in maintenance manuals.

SECTION 76 46 24
WOOD SHINGLE AND SHAKE SIDING

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Extra Stock Material: Furnish extra materials, from the same production run, to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Wood Shingles: 100 sq. ft. of each type, finish, and color in unbroken bundles.

1.7 QUALITY ASSURANCE

- A. Grading Agency Qualifications: An independent testing and inspecting agency recognized by authorities having jurisdiction as qualified to label siding for compliance with referenced grading rules.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store siding in a dry, well-ventilated, weathertight location in accordance with manufacturer's written instructions.
- B. Store rolls of felt used for weather-resistive barrier on end, and on pallets or other raised surfaces. Do not double stack rolls.
 - 1. Protect unused felt from weather, sunlight, and moisture when left overnight or when work is not in progress.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with installation only when existing and forecasted weather conditions permit siding installation and related Work to be performed in accordance with manufacturer's written instructions and warranty requirements.
 - 1. Field-Finished Siding: Proceed with installation of siding only when existing and forecast weather conditions permit installation and immediate application of at least one coat of specified finish on siding before it is exposed to rain, snow, or dampness.

1.10 WARRANTY

- A. Materials Warranty: Manufacturer's warranty administered by CSSB and on CSSB's standard form in which manufacturer agrees to repair or replace CSSB-labeled products that fail in materials within specified warranty period. Material failures include manufacturing defects that result in leaks.
 - 1. Warranty Period: 50 years from date of Substantial Completion.

SECTION 76 46 24
WOOD SHINGLE AND SHAKE SIDING

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each type of product from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire Resistance: Provide wood products that are fire-retardant treated in accordance with AWP A U1, pressure treated in closed vessels under pressures of not less than 50 psig, and as follows:
 - 1. Surface-Burning Characteristics: In accordance with ASTM E84; tested by a qualified testing agency acceptable to authorities having jurisdiction, as follows:
 - a. Flame-Spread Index: 25 or less.
 - b. Progressive Combustion: No evidence of significant progressive combustion when the test is continued for an additional 20-minute period.
 - c. Flame Front: Does not progress more than 10-1/2 ft. beyond the centerline of burners at any time during the test.
 - d. Effect of Weathering: No increase in the listed classification when subjected to accelerated weathering in accordance with ASTM D2898, Method A.
 - 2. Product Identification: Attach a label to each bundle of wood products that includes the following:
 - a. Identification mark of testing agency acceptable to authorities having jurisdiction.
 - b. Identification of treating manufacturer, chemical treatment, method of application, purpose of treatment, and warranties available.
 - c. Species of wood.
 - d. Flame-spread and smoke-developed indexes.
 - e. Method of drying after treatment.
 - f. The words "No increase in the listed classification when subjected to the Standard Rain Test."
 - g. References to model-code approval.
- B. Decay Resistance: Provide wood products that are preservative treated in accordance with AWP A U1, chromated copper arsenate pressure treatment; with a minimum of 0.40 lb/cu. ft. retention.
 - 1. Identification: Attach a label to each bundle of wood products; identify manufacturer and include chemical treatment, method of application, purpose of treatment, and warranties available.
- C. Grading Rules: Provide siding that complies with CSSB's grading rules for products indicated.
 - 1. Identification: Attach a label to each bundle of siding; identify manufacturer, type of product, grade, dimensions, and identification mark of grading agency.

SECTION 76 46 24
WOOD SHINGLE AND SHAKE SIDING

2.3 UNDERCOURSING

- A. Cedar Undercoursing Shingles: Smooth-sawn western red cedar shingles.
 - 1. Size: Length matching siding and in manufacturer's standard thickness
 - 2. Grade: No. 4, Undercoursing
 - 3. Finish: Match siding
- B. Ribbon-Coursed-Shingle Undercoursing: Match type, length, thickness, and grade of wood-shingle-siding outercourse
 - 1. Finish: Match exposed siding of outercourse

2.4 WOOD SHINGLE SIDING

- A. Smooth-Sawn Cedar Shingles: Western red cedar shingles.
 - 1. Grade: No. 1
 - 2. Size: 16 inches long; at butt.
 - 3. Finish: Oil-based primer, stain blocking, factory applied
 - a. Color: As selected by Architect from manufacturer's full range

2.5 ACCESSORIES

- A. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 25 mil.
 - 1. Primer: Product recommended in writing by manufacturer of flashing for applicable substrate.
- B. Nails: ASTM F1667, stainless steel, Type 304, or hot-dip galvanized-steel, ASTM A153/A153M coating, wire nails, sharp pointed, and of sufficient length to penetrate a minimum of 3/4 inch into sheathing.
 - 1. Cedar: Use box nails.
 - 2. Felt Weather-Resistive Barrier: Use roofing nails.
 - 3. Nails in Contact with Metal Flashing: Use nails made from same metal as flashing or made from metal compatible with metal flashing.
- C. Wood-Shingle-Clad Panel Fasteners: As recommended in writing by manufacturer
- D. Cedar Lath Strip: Western red cedar, clear heartwood, a minimum of 1-1/2 inches wide.

SECTION 76 46 24
WOOD SHINGLE AND SHAKE SIDING

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF FELT WEATHER-RESISTIVE BARRIER

- A. Comply with felt manufacturer's written installation instructions and CSSB written recommendations applicable to products and applications indicated unless more stringent requirements apply.
- B. Cover exposed exterior surface of sheathing with felt nailed to framing immediately after sheathing is installed.
 - 1. Apply horizontally with a 2-inch overlap and a 6-inch end lap. Wrap around inside and outside corners 4 inches.
 - 2. Cut back felt 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
 - 3. Apply felt to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.

3.3 INSTALLATION OF FLEXIBLE FLASHING

- A. Apply flexible flashing to comply with manufacturer's written installation instructions.
 - 1. Prime substrates as recommended by flashing manufacturer.
 - 2. 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.
 - 3. Lap flashing over felt weather-resistive barrier at bottom and sides of openings.
 - 4. Lap felt weather-resistive barrier over flashing at heads of openings.
 - 5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

3.4 INSTALLATION OF DOUBLE-COURSED WALLS

- A. Install products in continuous straight-line courses in accordance with manufacturer's written instructions and recommendations in CSSB's "Exterior and Interior Wall Manual."
- B. Undercourse: Install undercoursing under each course of outercourse beginning at base of wall. Fasten each undercoursing unit with single center-and-top nail.

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WOOD SHINGLE AND SHAKE SIDING

1. Install starter course of undercoursing doubled with joints offset a minimum of 1-1/2 inches (38 mm) between layers over wood lath to match slant of succeeding courses.
 - a. Extend starter course 1 inch below top of foundation wall.
 2. Space undercoursing shingles with at least 1/4-inch keyway.
 3. Install successive courses of undercoursing with joints offset a minimum of 1-1/2 inches from joints in adjacent outercourse.
 4. Match corner treatment of outercourse.
- C. Outercourse: Install wood siding with butts 1/2 inch lower than undercoursing butts (to conceal undercoursing butts) and with joints offset a minimum of 1-1/2 inches from joints in undercoursing and from adjacent courses of outercourse.
1. Fasten each unit with two exposed nails spaced 3/4 to 1 inch from edges and 2 inches above butt line.
 - a. Drive fasteners flush with top surface of units without crushing wood.
 - b. For shingles wider than 10 inches, install two additional fasteners, spaced 1 inch apart, at the center of unit.
 2. Interior Corner Treatment: Butted against wood stop
 3. Exterior Corner Treatment: Laced
- D. Weather Exposure and Spacing:
1. Wood Shingle Siding:
 - a. Maintain weather exposure of 5 inches for 16-inch- long shingles.
 - b. Space shingles with 1/8- to 1/4-inch keyway.
 2. Wood Shake Siding:

END OF SECTION 074624

SECTION 07 84 13
PENETRATION FIRESTOPPING

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Penetration firestopping systems.
- B. Related Requirements:
 - 1. Section 078443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.2 ACTION SUBMITTALS

- A. Product Data: Penetration firestopping systems.
- B. Sustainable Design Submittals:
- C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Listed System Designs: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

SECTION 07 84 13
PENETRATION FIRESTOPPING

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain penetration firestop systems for each type of opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test in accordance with testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with listed system designs published by a qualified testing agency.
 - 1) UL in its online directory "Product iQ."
 - 2) Intertek Group in its "Directory of Building Products."
 - 3) FM Approvals in its "Approval Guide."

2.3 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems are to be compatible with one another, with the substrates forming openings, and with penetrating items if any.

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PENETRATION FIRESTOPPING

- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined in accordance with ASTM E814 or UL 1479.
 - 1. F-Rating: Not less than the fire-resistance rating of the wall penetrated.
 - 2. Membrane Penetrations: Install recessed fixtures such that the required fire resistance will not be reduced.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined in accordance with ASTM E814 or UL 1479.
 - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of the floor penetrated.
 - 2. T-Rating: At least one hour, but not less than the fire-resistance rating of the floor. The following floor penetrations do not require a T-rating:
 - a. Those within the cavity of a wall.
 - b. Floor, tub, or shower drains within a concealed space.
 - c. 4-inch (200-mm) or smaller metal conduit penetrating directly into metal-enclosed electrical switchgear.
 - 3. W-Rating: Provide penetration firestopping systems with a Class 1 W-rating in accordance with UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined in accordance with UL 1479.
 - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, in accordance with ASTM E84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 - 1. Permanent forming/damming/backing materials.
 - 2. Substrate primers.
 - 3. Collars.
 - 4. Steel sleeves.

2.4 FILL MATERIALS

- A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

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- C. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- D. Intumescent Wrap Strips: Single-component intumescent elastomeric strips for use around combustible penetrants.
- E. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- F. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.
- G. Fire-Rated Cable Sleeve Kits: Complete kits designed for new or existing cable penetrations through walls to accept standard accessories.
- H. Thermal Wrap: Flexible protective wrap tested and listed for up to 2-hour fire ratings in accordance with ASTM E814 or UL 1479 for membrane penetrations or ASTM E1725 or UL 1724 for thermal barrier and circuit integrity protection.
- I. Fire-Rated Cable Pathways: Single or gangable device modules composed of a steel raceway with integral intumescent material and requiring no additional action in the form of plugs, twisting closure, putty, pillows, sealant, or otherwise to achieve fire and air-leakage ratings.
- J. Wall-Opening Protective Materials: Intumescent, non-curing putty pads or self-adhesive inserts for protection of electrical switch and receptacle boxes.
- K. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestop gasket for use around rectangular steel HVAC ducts without fire dampers.
- L. Firestop Plugs: Flexible, re-enterable, intumescent, foam-rubber plug for use in blank round openings and cable sleeves.
- M. Fire-Rated Cable Grommet: Molded two-piece grommet made of plenum-grade polymer and foam inner core for sealing small cable penetrations in gypsum walls up to 1/2 inch in diameter.
- N. Closet Flange Gasket: Molded, single-component, flexible, intumescent gasket for use beneath a water closet (toilet) flange in floor applications.
- O. Endothermic Wrap: Flexible, insulating, fire-resistant, endothermic wrap for protecting membrane penetrations of utility boxes, critical electrical circuits, communications lines, and fuel lines.

2.5 MIXING.

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

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PENETRATION FIRESTOPPING

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION OF PENETRATION FIRESTOPPING SYSTEMS

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

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PENETRATION FIRESTOPPING

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

SECTION 07 84 13
PENETRATION FIRESTOPPING

END OF SECTION 078413

SECTION 07 92 00
JOINT SEALANTS

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Mildew-resistant joint sealants.
5. Butyl joint sealants.
6. Latex joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Mildew-resistant joint sealants.
5. Butyl joint sealants.
6. Latex joint sealants.

B. Samples for Initial Selection: 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: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

A. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:

1. Joint-sealant location and designation.
2. Manufacturer and product name.
3. Type of substrate material.
4. Proposed test.
5. Number of samples required.

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- B. Field Quality-Control Reports: For field-adhesion-test reports, for each sealant application tested.
- C. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

- A. Manufacturers' special warranties.
- B. Installer's special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Authorized representative who is trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified in accordance with ASTM C1021 to conduct the testing indicated.

1.6 MOCKUPS

- A. Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.7 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 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.

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- 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 SOURCE LIMITATIONS

- A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 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.

2.3 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.

2.4 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested in accordance with ASTM C1248.
- B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, 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.

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2.5 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

2.6 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C1311.

2.7 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

2.8 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.
- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. 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.

2.9 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.

SECTION 07 92 00
JOINT SEALANTS

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting 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 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. Porous joint substrates include the following:
 - a. Unglazed surfaces of ceramic tile.
 - b. Exterior insulation and finish systems.
 - 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.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

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- 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 sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants in accordance with 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.
 - 4. Provide flush joint profile at locations indicated on Drawings in accordance with Figure 8B in ASTM C1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings in accordance with Figure 8C in ASTM C1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage

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JOINT SEALANTS

or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 08 14 16
FLUSH WOOD DOORS

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core fire-rated doors with hardwood faces
2. Soft-core doors with hardwood faces
3. Hollow-core doors with hardwood faces
4. Factory fitting flush wood doors to frames and factory machining for hardware.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of door indicated. Include details of core and construction and trim for openings.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door and frame location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of frame for each frame type, including dimensions and profile.
4. Dimensions and locations of mortises and holes for hardware.
5. Clearances and undercuts.
6. Requirements for veneer matching.
7. Doors to be factory primed or finished and application requirements.
8. Apply AWI Quality Certification Program label to Shop Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Special warranties.

B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

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- C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program
 - 1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.
- B. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies complies with qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:
 - 1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in cardboard cartons, and wrap bundles of doors in plastic sheeting.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations:
 - 1. Do not deliver or install doors until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of construction period.
 - 2. Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 17 and 50 percent during remainder of construction period.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors and frames that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

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2. Warranty also includes installation and finishing that may be required due to repair or replacement of defective doors and frames.
3. Warranty Period for Solid-Core Exterior Doors: Five years from date of Substantial Completion.
4. Warranty Period for Solid-Core Interior Doors: Life of installation.
5. Warranty Period for Hollow-Core Interior Doors: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain flush wood doors from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Wood Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.
- B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.3 FLUSH WOOD DOORS AND FRAMES, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WT's "Architectural Woodwork Standards."
 1. Provide labels and certificates from AWI certification program indicating that doors and frames comply with requirements of grades specified.
 2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with the Contract Documents in addition to those of the referenced quality standard.

2.4 INTERIOR DOORS FOR FACTORY FINISH

- A. Interior Fire Rated Doors:
 1. Grade: WDMA "A" Grade
 2. Faces: Natural Birch Veneer
 3. Exposed Vertical Edges: Manufacturer's standard
 4. Core: Manufacturer's standard non-asbestos, non-combustible core.
 5. Construction: Five plies
- B. Interior Hollow-Core Doors:

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1. Grade: WDMA "A" Grade
2. Faces: Natural Birch Veneer
3. Exposed Vertical Edges: Manufacturer's standard
4. Core: 5 inch to 7 inch Kraft paper cell core
5. Construction: Five plies
6. Application: For use at bi-fold closet door locations

C. Soft-Core Doors:

1. Grade: WDMA "A" Grade
2. Faces: Natural Birch Veneer
3. Exposed Vertical Edges: Manufacturer's standard
4. Core: 17 lbs. density agri-fiber (wheat or rice straw) core
5. Construction: Five plies
6. Application: Typical non-fire-rated interior door unless otherwise noted.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.

1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
2. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

1. Locate hardware to comply with DHI-WDHS-3.
2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.

C. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

2.6 FACTORY FINISHING

A. Comply with referenced quality standard for factory finishing.

1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
2. Finish faces, all four edges, edges of cutouts, and mortises.
3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

Retain one of first three paragraphs below.

B. Factory finish doors.

C. Transparent Finish:

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FLUSH WOOD DOORS

1. Architectural Woodwork Standards Grade: Premium.
2. ANSI/WDMA I.S. 1A Grade: Premium
3. Staining: As selected by Architect from manufacturer's full range
4. Sheen: Satin

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware"
- B. Install doors and frames to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Install frames level, plumb, true, and straight.
 1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
 2. Anchor frames to anchors or blocking built in or directly attached to substrates.
 - a. Secure with countersunk, concealed fasteners and blind nailing.
 - b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1) For factory-finished items, use filler matching finish of items being installed.
 3. Install fire-rated doors and frames in accordance with NFPA 80.
 4. Install smoke- and draft-control doors in accordance with NFPA 105.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

SECTION 08 14 16
FLUSH WOOD DOORS

3.3 FIELD QUALITY CONTROL

- A. Inspections:
 - 1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
 - 2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.
- B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- D. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 08 16 13
FIBERGLASS ENTRY DOORS

SECTION 081613 – FIBERGLASS ENTRY DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Fiberglass entry door system
 - 2. Aluminum combination doors

1.2 SUBMITTALS

- A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.
- B. Shop Drawings: Show the following:
 - 1. Elevations of each door design.
 - 2. Details of doors including vertical and horizontal edge details.
 - 3. Details and locations of reinforcement and preparations for hardware.
 - 4. Details of each different wall opening condition.
 - 5. Details of anchorages, accessories, joints, and connections.
- C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Storage & Protection: Store upright in a dry, well ventilated building or shelter at a constant temperature. Do not store in damp areas. Place units on wood blocks at least 2" high to prevent moisture at threshold and/or possible damage. Do not place in non-vented plastic or canvas shelters.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers and Products: Subject to compliance with requirements, provide one of the following, or approved equal.
 - 1. Fiberglass Entry Door Systems:
 - a. Therma-Tru Doors – Smooth-Star, S206 and S255
 - 2. Aluminum Combination Storm Door:
 - a. Larson Manufacturing Company – LIFE CORE SERIES, Model 271-TT

2.2 FIBERGLASS ENTRANCE DOORS

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FIBERGLASS ENTRY DOORS

- A. General: Provide doors of sizes, thicknesses, and designs indicated.
- B. Product Description:
 - 1. Door system components include: door panel, glass inserts, door frame, hinges, weather seals.
- C. MATERIALS
 - 1. Door Panel: 1/16 inch minimum thickness, fiberglass reinforced thermoset composite, surface lightly textured. Door edges are machinable kiln-dried pine, primed, lock edge reinforced with engineered lumber core, lockset area reinforced with solid blocking for hardware backup. Door bottom edge is moisture- and decay- resistant composite. Core is foamed-in-place polyurethane, density 1.9 pcf minimum.
 - 2. Finish: Provide stain package by door manufacturer.
 - 3. Hardware Preparation: Bottom rail may be machined to accept weather seal. Mounting surface for latching hardware to be reinforced with solid internal blocking. Hinge preparations are to be placed at manufacturer's specifications and are to be machined for standard weight full mortise 4" butt hinges. Latch preparations are to be placed at manufacturer's specifications.
 - 4. Glass Insert: Insulated tempered glass inserts shall be fabricated in 1" triple pane or double pane low-E construction. Glass frame may be "lip lite" or "flush glazed" design in rigid plastic, cellular vinyl or extruded aluminum.
 - 5. Door Frame: Wood frames shall be fabricated in a single rabbet jamb design. Hinge jamb(s), strike jamb, head jamb, and mullion(s) shall be machined to accept a kerf applied weather seal. Hinge jamb preparations are to be placed at manufacturer's specifications and are to be machined for standard weight full mortise 4" butt hinges. Strike jamb preparations are to be placed at manufacturer's specifications and are to be machined for full lip cylindrical strike plate. Inswing or bumper outswing threshold shall be high-dam design. ADA compliant -low profile threshold shall be required for handicap accessible openings at Type A and ADA Units. Provide weatherout frame with composite material at the bottom of the frame. Interior door frames to be unfinished stain grade pine frame with no finger joints, hinges at standard manufacturers location, bore t standard location, standard weight hinges.
 - 6. Hinges: (3) standard weight full mortise 4" butt hinges are required.
 - 7. Weather Seal: Door frame shall be fabricated featuring a vinyl wrapped foam filled compression weather seal that is kerf installed. Corner seals shall be installed at the rabbet section of the door frame at the bottom of the hinge and lock jamb. Door bottom sweep shall be sealed and securely attached to the operable door panel.
 - 8. Thermal Performance: Maximum U-value 0.035

2.3 ALUMINUM COMBINATION STORM DOOR

- A. Product Description:
 - 1. Door system components include:

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- a. High-impact-resistant solid wood core with aluminum-clad exterior and maintenance free finish.
- b. Hardware includes: Heavy-duty hinges, reversible for right or left mounting, adjustable speed closer, black push-button handle, weatherstripping.
- c. Glass inserts and screens included.
- d. Color: Earthtone Brown.
- e. Door Style: Mid-View with self-storing screen.
- f. Limited Lifetime Warranty.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.
- B. Examination: Verify that substrate conditions are acceptable for the product installation instructions in accordance with manufacturer's specifications. Verify that door frame openings are constructed plumb, true and level before beginning installation process.
- C. Placing Doors and Frames: Remove protective packaging just prior to installation. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.
- D. Flashing, Insulating & Trimming: Exterior of installed unit shall be flashed, trimmed & sealed to prevent air infiltration and/or water penetration. Interior of installed unit shall be insulated & trimmed to prevent thermal and/or acoustical transmission.
- E. Finishes: Various types of materials are used in the construction of the door system; each shall be sealed in accordance with manufacturer's specifications to protect against various environmental conditions. Seal and inspect all 5-surfaces (top, hinge side, lock side, exterior face and interior face) of the active door panel. Finishing and/or re-finishing must be completed within 45-days from the time the protective packaging is removed and/or the installation is performed.

END OF SECTION 081613

SECTION 08 11 13
ACCESS DOORS

SECTION 081113 – ACCESS DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Access doors and frames for walls and ceilings.

1.2 SUBMITTALS

- A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain access door(s) and frame(s) through one source from a single manufacturer.
- B. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.4 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Steel Sheet: Uncoated or electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

SECTION 08 11 13

ACCESS DOORS

1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 2. Surface Preparation for Metallic-Coated Steel Sheet: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 - a. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
 3. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.
- D. Drywall Beads: Edge trim formed from 0.0299-inch (0.76-mm) zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: Acudor Products, Inc.
1. Babcock-Davis; A Cierra Products Co.
 2. Bar-Co, Inc. Div.; Alfab, Inc.
 3. Cendrex Inc.
 4. Dur-Red Products.
 5. Elmdor/Stoneman; Div. of Acorn Engineering Co.
 6. Jensen Industries.
 7. J. L. Industries, Inc.
 8. Karp Associates, Inc.
 9. Larsen's Manufacturing Company.
 10. MIFAB, Inc.
 11. Milcor Inc.
 12. Nystrom, Inc.
 13. Williams Bros. Corporation of America (The).
- B. Exterior Flush Access Doors and Frames with Exposed Trim: Weatherproof with extruded door gasket.
1. Locations: Ceiling surfaces.
 2. Door: Minimum 0.040-inch (1.0-mm-) thick, metallic-coated steel sheet; flush panel construction with manufacturer's standard 2-inch- (50-mm-) thick fiberglass insulation.
 3. Frame: Minimum 0.060-inch (1.5-mm-) thick extruded aluminum.
 4. Hinges: Continuous piano, zinc plated.
 5. Lock: Dual-action handles with key lock.
 6. Size: 22 inches by 36 inches.

SECTION 08 11 13
ACCESS DOORS

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
 - 1. Exposed Flanges: Nominal 1 to 1-1/2 inches (25 to 38 mm) wide around perimeter of frame.
 - 2. Provide mounting holes in frames for attachment of units to metal or wood framing.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder lock, furnish two keys per lock and key all locks alike.
 - 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08311

SECTION 08 54 13
FIBERGLASS WINDOWS

SECTION 085413 - FIBERGLASS WINDOWS

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 fiberglass-framed windows.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review, discuss, and coordinate the interrelationship of fiberglass windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
 - 3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
 - 4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for fiberglass windows.
- B. Shop Drawings: For fiberglass windows.
 - 1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples for Initial Selection: For units with factory-applied finishes.
 - 1. Include Samples of hardware and accessories involving color selection.
- D. Samples for Verification: For fiberglass windows and components required, prepared on Samples of size indicated below:

SECTION 08 54 13
FIBERGLASS WINDOWS

1. Exposed Finishes: 2 by 4 inches.
- E. Product Schedule: For fiberglass windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of fiberglass window, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating fiberglass windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.
- B. Installer Qualifications: An installer acceptable to fiberglass window manufacturer for installation of units required for this Project.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace fiberglass windows that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, and air infiltration.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal weathering.
 - e. Failure of insulating glass.
 2. Warranty Period:
 - a. Window: 10 years from date of Substantial Completion.
 - b. Glazing Units: 10 years from date of Substantial Completion.

SECTION 08 54 13
FIBERGLASS WINDOWS

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fiberglass windows from single source from single manufacturer.
- B. Basis-of-Design:
 - 1. Essential by Marvin Windows and Doors.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Window Certification: WDMA certified with label attached to each window.

2.3 FIBERGLASS WINDOWS

- A. Operating Types: Provide the following operating types in locations indicated on Drawings:
 - 1. Casement: Project out.
 - 2. Double hung..
- B. Frames and Sashes: Pultruded fiberglass complying with AAMA/WDMA/CSA 101/I.S.2/A440 and with exposed exterior fiberglass surfaces finished with manufacturer's standard enamel coating complying with AAMA 613.
 - 1. Frame thickness: 0.075-0.077 inches thick wall
 - 2. Jamb Depth: 2 inches
 - 3. Finish: Factory backed on acrylic urethane.
 - 4. Exterior Color: As selected by Architect from manufacturer's full range
 - 5. Interior Finish: As selected by Architect from manufacturer's full range
- C. Glass: Clear annealed glass, ASTM C1036, Type 1, Class 1, q3.
 - 1. Kind: Fully tempered where required by code.
- D. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock fiberglass windows, and sized to accommodate sash weight and dimensions.
 - 1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range

SECTION 08 54 13
FIBERGLASS WINDOWS

E. Projected Window Hardware:

1. Gear-Type Rotary Operators: Complying with AAMA 901 when tested according to ASTM E405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.
 - a. Type and Style: As selected by Architect from manufacturer's full range of types and styles
2. Hinges: Manufacturer's standard type for sash weight and size indicated
3. Single-Handle Locking System: Operates positive-acting arms that pull sash into locked position. Provide one arm on sashes up to 27-1/2 inches tall and two arms on taller sashes.
4. Limit Devices: Concealed support arms with adjustable, limited, hold-open limit devices designed to restrict sash opening.

F. Hung Window Hardware:

1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.
2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only. Provide custodial locks.
3. Tilt Hardware: Releasing tilt latch allows sash to pivot about horizontal axis to facilitate cleaning exterior surfaces from the interior.

G. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

H. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

A. Grilles-Between-The-Glass (GBG)

1. Manufactured from aluminum in 23/32 inch wide contoured profile placed between the panes of glass.
 - a. Colors: As selected by Architect from Manufacturer's full range.
 - b. Pattern: Rectangular.

2.5 INSECT SCREENS

A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.

1. Type and Location:
 - a. Full, inside for project-out

SECTION 08 54 13
FIBERGLASS WINDOWS

- b. Full, outside for double-hung
- B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
 - 1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.
 - 2. Finish for Interior Screens: Baked-on organic coating in color selected by Architect from manufacturer's full range
 - 3. Finish for Exterior Screens: as selected by Architect from manufacturer's full range
- C. Aluminum Wire Fabric: 18-by-16 mesh of 0.011-inch- diameter, coated aluminum wire.
 - 1. Wire-Fabric Finish: Black.

2.6 FABRICATION

- A. Fabricate fiberglass windows in sizes indicated. Include a complete system for installing and anchoring windows.
- B. Glaze fiberglass windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

SECTION 08 54 13
FIBERGLASS WINDOWS

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.
 - 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085413

SECTION 08 71 00
DOOR HARDWARE

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:
 - a. Swinging doors.
 - b. Sliding doors.
 - c. Folding doors.
2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

B. Related Requirements:

1. Section 083113 "Access Doors and Frames" for access door hardware,

1.2 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

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.

B. Samples for Initial Selection: For each type of exposed finish.

- C. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
3. Content: Include the following information:

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DOOR HARDWARE

- a. Identification number, location, hand, fire rating, size, and material of each door and frame.
 - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
- D. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Architectural Hardware Consultant if used.
- B. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- B. Schedules: Final door hardware and keying schedule.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware and keying schedule.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

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DOOR HARDWARE

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
 - a. Exit Devices: Two years from date of Substantial Completion.
 - b. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.
1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 HINGES.

- A. Hinges: BHMA A156.1.
- B. Available Manufacturers:
1. Hager Companies (HAG)
 2. McKinney Products Company, An ASSA ABLOY Group Company (MCK)
 3. Stanley Commercial Hardware, Div. of The Stanley Works (STH)
- C. The following guide for hinge size and type required for this project:

	Manufacturer	Interior
1-3/8" Doors up to 3'-0" wide	Stanley	F179- 3-1/2"
	Hager	1279-3-1/2"
	McKinney	T2714-3-1/2"
1-3/4" Doors up to 3'-0" wide	Stanley	F179-4-1/2"

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DOOR HARDWARE

Hager	1279-4-1/2"
McKinney	T2713-4-1/2"

2.3 LOCK CYLINDERS

- A. Standard Lock Cylinders: BHMA A156.5, grade 1, face finished to match lockset.
- B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel or nickel silver, and complying with the following:
 - 1. Number of pins: Five
 - 2. Bored-Lock Type: Cylinders with tailpieces to suit locks.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cylinders: Same manufacturer as for locks and latches.

2.4 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:
 - 1. Master Key System: Cylinders are operated by a change key and master key.
- B. Keys: Nickle Silver
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: Information to be furnished by Owner.
 - 2. Quantity: In addition to one extra black key for each lock, provide the following:
 - a. Cylinder Change Keys: Three
 - b. Master Keys: Three

2.5 KEY CONTROL SYSTEM

- A. Cross-Index System: Multiple-index system for recording key information. Include three receipt forms for each key-holding hook. Set up by key control manufacturer.
- B. Astragals: BHMA A156.22.

2.6 BORED LOCKS AND LATCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis of Design Product: Dormakaba CL700 Series 2 Cylindrical Lockset, LG Lever Design or approved substitute.
- B. Bored Locks: HHMA Grade 2; Series 4000

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DOOR HARDWARE

2.7 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
- B. Maximum Air Leakage: When tested in accordance with ASTM E283 with tested pressure differential of 0.3-inch wg, as follows:
 - 1. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
- C. Lock Functions: Lock functions as indicated in the hardware schedule shall be as follows:

FUNCTION

- (1) (Utility)
 - (2) (Office)
 - (3) (Passage)
 - (4) (Classroom)
 - (5) (Entrance)
 - (6) (Privacy)
- D. Provide dummy levers where indicated.

2.8 LOCK CYLINDERS

- A. Standard Lock Cylinders: BHMA A156.6, Grade 1, face finished to match lockset.
- B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
 - 1. Number of Pins: Five
 - 2. Bored-Lock Type: Cylinders with tailpieces to suit locks.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cylinders: Same manufacturer as for locks and latches.

2.9 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

2.10 SLIDING DOOR HARDWARE

- A. Sliding Door Hardware: BHMA A156.14; consisting of complete sets including rails, hangers, supports, bumpers, floor guides, and accessories indicated.

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DOOR HARDWARE

- B. Bypassing Sliding Door Hardware: Rated for weight of door slabs hardware is supporting, 125 lb minimum.
- C. Available Manufacturers:
 - 1. Hager Companies (HAG)
 - 2. Stanley Commercial Hardware, Div. of The Stanley Works (STH)
 - 3. Approved equal.

2.11 FOLDING DOOR HARDWARE

- A. General: BHMA A156.14; complete sets including overhead rails, hangers, supports, bumpers, floor guides, and accessories indicated.

2.12 STOPS AND HOLDERS

- A. Stops and Bumpers: BHMA A156.16, Grade 1
 - 1. Provide wall stops for doors unless floor or other type are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.
 - 2. Provide matching finishes for hardware units at each door or opening, to the greatest extent possible, and expect as otherwise indicated. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening. In general, match items to the manufacturer's standard finish for the latch and lock set for color and texture.
- B. Wall Stops: Wall type door on brass extension shall be used where ever possible.
 - 1. Available Products:
 - a. Schlage, Model Number 61MB 619 Finish: No. 619 Satin Nickel.

2.13 DOOR GASKETING

- A. Standard: BHMA A156.22
- B. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

2.14 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.
 - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and

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hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

2.15 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide the following finishes:
 - 1. Butts and Hinges: 26D
 - 2. Locks & Lock Trim: 26D
 - 3. Door Controls – Closers: Sprayed Alum. Finish
 - 4. Door Stops: 26D
 - 5. Kickplates 32D
 - 6. Pulls 32D

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Wood doors: Comply with DHI A115-W Series

3.2 PREPARATION

- A. Wood Doors: Comply with door and hardware manufacturers' written instructions.

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3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying schedule.
- E. Key Control System:
 - 1. Key Control Cabinet: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
 - 2. Key Lock Boxes: Install where indicated or approved by Architect to provide controlled access for fire and medical emergency personnel.
 - 3. Key Control System Software: Set up multiple-index system based on final keying schedule.
- F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- G. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- I. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

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- J. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
 2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.
 3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DOOR HARDWARE SCHEDULE

- A. The hardware sets listed below indicate the items of hardware required for each opening. It is the bidders' responsibility to accurately furnish the proper quantities, items, sizes, weights and functions as required by the plans and specification. If an opening has, through error, been omitted from the following hardware sets, it shall be the bidder's responsibility to supply hardware of equivalent quality and quantity, as that which is specified for a comparable opening.

HW1

Doors: 100, 101, 110, 111

Each door to have: Lockset (Function 5, Entrance), Wall Stop, remainder of hardware by door supplier, including but not limited to weatherstripping, hinges.

HW2

Doors: 102, 103, 105, 107, 108, 113, 114, 115, 120, 121, 203

Each door to have: Hinges, Latches (Function 1, Passage)

HW3

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DOOR HARDWARE

Doors: 104, 106, 116, 118, 119, 202

Each door to have: Hinges, Latches (Function 6 Privacy), wall stop

HW4

Doors: 201, 204

Each door to have: Hinges, Latches (Function 6 Privacy)

HW5:

Doors: 109, 112

Each door to have: Bi-Parting Door Hardware

HW6

Doors: 117, 200, 205

Each door to have: Sliding Door Hardware

END OF SECTION 087100

SECTION 08 80 00
GLAZING

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass products.
2. Insulating glass.
3. Glazing sealants.
4. Glazing tapes.
5. Miscellaneous glazing materials.

1.2 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.3 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For glass.

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

1.6 QUALITY ASSURANCE

- A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved and certified by primary glass manufacturer.
- B. Installer Qualifications: 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 who employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.9 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

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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 Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty for Heat-Soaked Tempered Glass: Manufacturer agrees to replace heat-soaked tempered glass units that spontaneously break due to nickel sulfide (NiS) inclusions at a rate exceeding 0.3 percent (3/1000) within specified warranty period. Coverage for any other cause is excluded.
 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain tinted and coated glass from single source from single manufacturer.
- B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

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1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.
1. Minimum Glass Thickness for Exterior Lites: 6 mm.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- B. Reflective- and Low-E-Coated Vision Glass: ASTM C1376.
- C. Reflective- and Low-E-Coated Spandrel Glass: ASTM C1376, Kind CS.

2.5 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.

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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 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.

2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks:
1. Type recommended in writing by sealant or glass manufacturer.
- D. Spacers:
1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 2. Type recommended in writing by sealant or glass manufacturer.
- E. Edge Blocks:
1. EPDM or Silicone with Shore A durometer hardness per manufacturer's written instructions.

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2. Type recommended in writing by sealant or glass manufacturer.
- F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces temperature change.
 - B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
 - C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

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GLAZING

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

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- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

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- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 09 29 00
GYPSUM BOARD

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Mold-resistant gypsum board.
4. Cementitious backer units.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

SECTION 09 29 00
GYPSUM BOARD

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.3 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.

2.4 INTERIOR GYPSUM BOARD

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. G-P Gypsum Corp.
 - b. National Gypsum Company
 - c. United States Gypsum Company
- B. Gypsum Wallboard: ASTM C1396/C1396M.
 - 1. Thickness: 5/8 inch unless otherwise noted on drawings.
 - 2. Long Edges: Tapered
 - 3. Location: As indicated
- C. Gypsum Board, Type X: ASTM C1396/C1396M.
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.
 - 3. Location: As indicated
- D. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.
 - 1. Core: 5/8 inch, Type X.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

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GYPSUM BOARD

2.5 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.
 - 1. Core: As indicated on Drawings
 - 2. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
- B. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.
 - 1. Thickness: As indicated on Drawings.
 - 2. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet
 - 2. Shapes:
 - a. Cornerbead: Use at outside corners, unless otherwise indicated.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound: use at exposed panel edges or where abutting different materials.

2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, 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 or drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use same as fill coat.
- D. Joint Compound for Tile Backing Panels:

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GYPSUM BOARD

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.
3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.8 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.
 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."
- F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."
- G. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

SECTION 09 29 00
GYPSUM BOARD

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. 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.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

SECTION 09 29 00
GYPSUM BOARD

3.3 INSTALLATION OF TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at showers, tubs, and where indicated on Drawings and locations indicated to receive tile. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
- B. Cementitious Backer Units: ANSI A108.11, at showers, tubs, and where indicated on Drawings and locations indicated to receive tile.
- C. Water-Resistant Backing Board: Install where indicated with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
- D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.4 INSTALLATION OF TRIM ACCESSORIES

- A. General: 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.

3.5 FINISHING OF GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. 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 4: At panel surfaces that will be exposed to view unless otherwise indicated
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

SECTION 09 29 00
GYPSUM BOARD

3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 09 30 13
CERAMIC TILING

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Porcelain tile.
 - 2. Trim tiles and accessories
 - 3. Crack isolation membranes.

1.2 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. Face Size: Actual tile size, excluding spacer lugs.
- C. Module Size: Actual tile size plus joint width indicated.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- D. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
 - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
 - 3. Full-size units of each type of trim and accessory for each color and finish required.
 - 4. Stone thresholds in 6-inch lengths.

SECTION 09 30 13
CERAMIC TILING

- 5. Metal edge strips in 6-inch lengths.

1.5 INFORMATIONAL SUBMITTALS

- A. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- B. Product Certificates: For each type of product.
- C. Product Test Reports: For tile-setting and -grouting products.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer is a Five-Star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

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CERAMIC TILING

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. American Marazzi Tile, Inc. which is located at 259 Clay Road, Sunnyvale, TX 75812; Telephone: 972.232.3801
 - 2. Daltile Colorbody porcelain
- B. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
 - 2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.
- D. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 - 1. Stone thresholds.
 - 2. Waterproof membrane.
 - 3. Crack isolation membrane.
 - 4. Cementitious backer units.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

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1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

- A. Glazed Porcelain Floor Tiel:
 1. Series **Aida**
 2. Composition: Procelain
 3. Field Tile: 12 by 12 by 5/16 inch
 4. SGN Trim Tiles: 3 by 12 inch
 5. Corner Trim Tiles: 3 by 3 inch
 6. Colors: **Aida – Entry**

2.4 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C503/C503M, with a minimum abrasion resistance of 10 or 12 according to ASTM C1353 or ASTM C241/C241M and with honed finish.
 1. Description:
 - a. Uniform, fine- to medium-grained white stone with gray veining.
 - b. Have bevel profile meeting accessibility requirements for sufficient length to form the transition from the tile flooring to adjacent flooring materials.
 - c. Threshold shall be available in lengths up to 48 inches to minimize joints.
 - d. Thickness: Sufficient to match tile thickness.
 - e. Units for thin tiles that are less than 5/8 inch thick shall have bevels on each side.
 - f. Material: As selected by Architect from manufacturer's standard colors.
- C. Solid Polymer Thresholds: Made from homogeneous solid sheets of filled resin complying with material and performance requirements in ASNI Z 124.3, for Type 5 or Type 6 without precoated finish.
 1. Available Manufacturers:
 - a. Avonite, Inc.
 - b. DuPont Polymers
 - c. Formica Corporation
 - d. Swan Corporation (The).
 - e. Wilsonart International

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f. Or Approved Equal.

2.5 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A, in maximum lengths available to minimize end-to-end butt joints.
 - 1. Thickness: As indicated.
- B. Fiber-Cement Backer Board: ASTM C1288, in maximum lengths available to minimize end-to-end butt joints.
 - 1. Thickness: As indicated.

2.6 WATERPROOF MEMBRANES

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

2.7 CRACK ISOLATION MEMBRANES

- A. General: Manufacturer's standard product, that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

2.8 SETTING MATERIALS

- A. Standard Dry-Set Mortar (Thinset): ANSI A118.1.
 - 1. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.
- B. Modified Dry-Set Mortar (Thinset): ANSI A118.4.
 - 1. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.9 GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.
- B. Standard Cement Grout: ANSI A118.6.
- C. High-Performance Tile Grout: ANSI A118.7.
 - 1. Polymer Type:
 - a. Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.

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- D. Grout for PregROUTed Tile Sheets: Same product used in factory to pregrout tile sheets.

2.10 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils thick.
- C. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A276/A276M or ASTM A666, 300 Series exposed-edge material.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

2.11 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

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- a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Crack and Control Joints for Thin-Set Tile:
 - 1. Install crack and suppression materials a minimum of 12 inches wide over construction and control joints. Install in accordance with manufacturer's instructions.

3.3 INSTALLATION

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

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- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished work.
- F. Grout tile to comply with the requirements of the following tile installation standards:
 - 1. For ceramic tile grouts (sand-portland cement, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.
 - 2. For chemical-resistant epoxy grouts, comply with ANSI A108.6.
 - 3. For chemical-resistant furan grouts, comply with ANSI A108.8.
- G. Joint Sealants: Install sealant in floor tile joint directly above control joints and crack suppression material. Install sealant in tile joint at perimeter edges of floor tile and tile base or dissimilar base materials.

3.4 FLOOR TILE INSTALLATION

- A. General: Install tile to comply with requirements in the Ceramic Tile Floor Installation Schedule, including those referencing TCA installation methods and ANSI A108 series of tile installation standards.
 - 1. For installations indicated below, follow procedures in ANSI A 108 series of tile installation standards for providing 95 percent mortar coverage.
 - a. Tile floors in wet areas.
 - b. Tile floors in laundries.
 - c. Tile floors composed of 8 by 8 inches (200 by 200 mm) or larger.
- B. Joint Widths: Install tile on floors with the following joint widths:

Below are examples only and are based on widths recommended by American Olean Tile for its products. Retain one width for each tile type or revise but only after verifying widths with tile manufacturers for products selected. Correlate widths with grout selections and with module sizes/facial dimensions specified for tile types in Part 2. See Editing Instructions No. 6 and No. 10 in the Evaluations.

 - 1. Ceramic Mosaic Tile: 1/16 inch.
 - 2. Paver Tile: 1/4 inch (6.35 mm).
- C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.
 - 1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.
- D. Metal Edge Strips: Install at location indicated, or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
- E. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer that has gotten on tile faces by wiping with soft cloth.

3.5 CLEANING AND PROTECTING

SECTION 09 30 13
CERAMIC TILING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to grout manufacturer's written instructions. Use only cleaners recommended by grout manufacturer and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. If applicable, remove temporary protective coating by method recommended by coating manufacturer. Trap and remove coating to prevent it from clogging drains.
 - 4. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure tile is without damage or deterioration at the time of Substantial Completion.
 - 1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with carpet pad or other heavy covering during construction period to prevent staining, damage, and wear.
 - 2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.6 CERAMIC TILE FLOOR INSTALLATION SCHEDULE

- A. Ceramic Tile Floor Installation: Where interior floor installations of this designation are indicated, comply with the following:
 - 1. Tile Type: Glazed Porcelain Tile.
 - 2. Installation Method: TCA F113 (thin-set mortar bonded to concrete subfloor).
 - 3. Setting Bed and Grout: ANSI A108.5 with the following mortar and grout:
 - a. Latex-portland cement mortar.
 - b. Sanded polymer-modified tile grout.

Edit paragraph below to specify wall installations bonded with organic adhesive.

3.7 WASTE MANAGEMENT

- A. Separate waste in accordance with the Waste Management Plan and place in designated areas in the following categories for recycling:
 - 1. Half tiles and larger: Set aside for reuse by Owner.
 - 2. Broken tile, cutoffs smaller than 1/2 tile, and excess mortar and grout: Crush for use as mosaic, sub-base, or fill.
 - 3. Separate metal waste and place in designated area for recycling.

SECTION 09 30 13
CERAMIC TILING

4. Separate cardboard waste and place in designated area for recycling.

END OF SECTION 093013

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Thermoplastic-rubber base.
 - 2. Vinyl 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.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

- 1. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E548 or NFPA 253 by a qualified testing agency.
 - a. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg for more than 5 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE <Insert drawing designation>

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries
 - 2. Johnsonite/Tarkett
- B. Product Standard: ASTM F1861, Type TP (rubber, thermoplastic).
 - 1. Group: I (solid, homogeneous).
 - 2. Style and Location:
 - a. Style B, Cove:
- 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: As selected by Architect from Manufacturer's full range.

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

2.2 VINYL STAIR ACCESSORIES

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- C. Stair Treads: ASTM F2169, Type TV (vinyl, thermoplastic).
 - 1. Class: [1 (smooth, flat)] [2 (pattern; embossed, grooved, or ribbed)].

Insert specific requirements in "Group" Subparagraph below to suit Project. For example, insert quantity of abrasive strips required per tread or specific contrasting strip locations.

- 2. Group: [1 (embedded abrasive strips)] [2 (with contrasting color for the visually impaired)].
- 3. Nosing Style: [Square, adjustable to cover angles between 60 and 90 degrees] [Square] [Round].
- 4. Nosing Height: [1-1/2 inches (38 mm)] [2 inches (51 mm)] [2-3/16 inches (56 mm)] <Insert dimension>.
- 5. Thickness: [1/4 inch (6 mm) and tapered to back edge] <Insert thickness>.
- 6. Size: Lengths and depths to fit each stair tread in [one piece] [one piece or, for treads exceeding maximum lengths manufactured, in equal-length units].

Retain "Integral Risers" Subparagraph or "Separate Risers" Paragraph below.

- 7. Integral Risers: Smooth, flat; in height that fully covers substrate.
- D. Separate Risers: Smooth, flat; in height that fully covers substrate; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
 - 1. Style: [Coved toe, 7 inches (178 mm) high by length matching treads] [Toeless, by length matching treads].
 - 2. Thickness: [0.125 inch (3.2 mm)] [0.080 inch (2.0 mm)] [Manufacturer's standard] <Insert thickness>.
- E. Stringers: Height and length after cutting to fit risers and treads and to cover stair stringers, produced by same manufacturer as treads, and recommended by manufacturer for installation with treads.
 - 1. Thickness: [0.125 inch (3.2 mm)] [0.080 inch (2.0 mm)] [Manufacturer's standard] <Insert thickness>.

Retain "Landing Tile" Paragraph below if required. Not all manufacturers provide landing tiles to match treads.

- F. Landing Tile: [Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads] <Insert requirements>.
- G. Locations: [Provide vinyl stair accessories in areas indicated] <Insert requirements>.

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

Retain "Colors and Patterns" Paragraph below if colors and patterns are not indicated in a separate schedule.

- H. Colors and Patterns: **[As indicated by manufacturer's designations] [Match Architect's sample] <Insert colors and patterns>.**

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.

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

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. Job-Formed Corners:

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

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. Floor Polish: Remove soil, adhesive, and blemishes from resilient stair treads before applying liquid floor polish.
 1. Apply one coat.
- E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 09 65 19
RESILIENT TILE FLOORING

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid vinyl floor tile.

1.2 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 Initial Selection: For each type of floor tile indicated.

D. Samples for Verification: Full-size units of each color and pattern of floor tile required.

E. Product Schedule: For floor tile.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.5 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.

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RESILIENT TILE FLOORING

1.6 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.

1.7 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.

1.8 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. Beginning 48 hours 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 SOLID VINYL FLOOR TILE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Flooring; Parallel 12 or comparable product by the following:
 - 1. Kahrs; Click Plank.
- B. Thickness: 5.0 mm.
- C. Size: 9 by 48 inches.
- D. Installation Method: Loose lay.
- E. Colors and Patterns:
 - 1. As Selected by Architect from manufacturer's full range.

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RESILIENT TILE FLOORING

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions equal to or less than 90% RH.

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.
- 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 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.
- E. 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.

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RESILIENT TILE FLOORING

- 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.
- 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.
 - 1. Lay tiles with grain running in one direction in pattern of colors and sizes indicated.
- 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.

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 096519

SECTION 09 65 70
SMOOTH SHEET VINYL

SECTION 096570 – SMOOTH SHEET VINYL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Smooth Sheet Vinyl Flooring

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- D. Samples for Verification:
 - 1. 6 inch by 9 inch sample pieces of sheet material.

1.3 INFORMATIONAL SUBMITTALS

- A. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- B. Product Certificates: For each type of product.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:

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1. Bond Test: Install multiple bond tests using 3'x3' of material adhered with the appropriate adhesive to verify quality of adhesion. Remove half of each piece after 24 hours, then remove the other half after 48 hours.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store rolls in dry locations. Stand rolls on end. Protect and secure rolls from falling.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design product, or approved equal
 1. Altro Operetta by Altro

2.2 PRODUCTS, GENERAL

- A. Sheet Vinyl Flooring
 1. Slip Resistance: Meets ASTM D2047
 - a. Dry 0.7
 - b. Wet 0.8
 2. Thickness: 2.0 mm
 3. Roll Width: 6'-7"
 4. Weight: 4.0 lbs/yd²
 5. Sound Insulation: 4dB
- B. ACCESSORIES
 1. Cove former: manufacturer acceptable material, sized to suit application
 - a. 1 inch radius
 2. Gulley edge: manufacturer acceptable material, sized to suit application
 - a. Vinyl
 - b. GA 35/25
 3. Cap Strip: manufacturer acceptable material
 - a. Vinyl
 4. Metal edge strips

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- a. Aluminum extruded, mill finish with lip to extend over flooring
- 5. Adhesives
 - a. Leveling and Patching Compounds.
 - 1) Latex modified, moisture resistant, silicate free, Portland cement based or blended hydraulic-cement-based formulation.
 - b. Adhesives
 - 1) Ecofix 20 or equal – Hard set for heavy rolling loads
 - 2) Ecofix 25 or equal – Acrylic general adhesive
 - 3) Altrofix 30 or equal – 2-part polyurethane for areas prone to moisture
 - 4) Altrofix 31 or equal – 2-part polyurethane fast set adhesive

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog and installation instructions.
- B. Site Verification or Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.2 PREPARATION

- A. Remove substrate paint, coatings and other substances that are incompatible with adhesives or contain soap, wax, oil, solvents, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- B. Permanent and non-permanent markers, pens, crayons, and paint shall not be used to write on the back of the floor material or to mark the substrate.
- C. Smooth floor shall be installed over subfloors conforming to ASTM F710 for concrete and other monolithic floors and ASM F1482 for wood subfloors.
- D. Always conduct moisture tests per ASTM F-2170 on all concrete slabs regardless of age or grade level. ASTM F-2170 Internal Relative Humidity (IRH) test results must not exceed 90%. Alkalinity testing per ASTM F710 with an acceptable range of 7-9.9 pH.
- E. Do not proceed with work until results of moisture condition tests are acceptable.
- F. When patching, a moisture tolerant patching compound must always be used.
- G. Contingency for High Moisture Readings in Concrete:
 - 1. If at the time of installation the moisture reading are in excess of Altro's recommendations, the General Contractor shall employ a means of Moisture Mitigation. This includes, but in not limited to, the following methods:
 - a. Application of a Moisture Reduction Barrier (MRB)
 - b. Temporary use of dehumidification equipment.

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SMOOTH SHEET VINYL

c. Postponing of the flooring installation start time.

- H. Wood Subfloors: Confirm wood subfloors meet the following requirements.
1. Must conform to ASTM F-1482 Standard Guide to Wood Substrates.
 2. Wood subflooring shall have a minimum of 18 inch of cross-ventilated space beneath the bottom of the joist. The floor must be rigid, free of movement.
 3. Do not install directly on OSB (Oriented Strand Board), particle board, chipboard, luan or composite type panels unless specifically designed and approved by the manufacturer for use as a resilient flooring underlayment.

3.3 INSTALLATION

- A. Install sheet vinyl flooring in accordance with current manufacturer practices. All seams to be heat welded.
- B. Drains: Fit flooring and mechanically fasten to drain outlets to ensure permanent, watertight installation. The installation of flooring in wet environment is a system installation. All circular drain covers must Surface-Membrane Campling Style Drains or modified to be in the field. The gulley edge/angle, cove former and cap strip accessories are necessary accessories for a water-tight and manufacturer compliant installation.
- C. Coved Installation: Where flooring is coved up wall surfaces and other abutments, installation shall be in accordance with manufacturer installation practices using the following accessories:
1. At standard wall finishes: Use Altro C5 vinyl cap strip or approved equal to accommodate sheet vinyl to 4 inch height.

3.4 CLEANING AND PROTECTING

- A. Cleaning: Remove temporary coverings and protection of adjacent areas.
1. Repair or replace damaged installed products
 2. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.
- B. Protection:
1. Sweep or vacuum all construction debris and dust first, then clean the flooring with manufacturer's recommended products and auto scrubber.
 2. Cover and protect finished installation from damaged from other trades using a non-staining, temporary floor protection system.
 3. Never use tapes on the surface on the finish flooring. Markers, pens, crayons or construction markers on either the finish flooring or the substrate.
 4. No traffic for 24 hours after installation.
 5. No heavy traffic, rolling loads, or furniture, application or equipment placement for 72 hours after installation.
 6. Wait 72 hours after installation before performing initial cleaning. Start a regular maintenance program after the initial cleaning as recommended by manufacturer.

END OF SECTION 096570

SECTION 09 91 13
EXTERIOR PAINTING

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Ferrous Metal
 - 2. Fiberglass
 - 3. Fiber-Cement
 - 4. Galvanized metal.
 - 5. PVC
 - 6. Wood trim
- B. Related Requirements:
 - 1. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.

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1. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. 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.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.
- B. Furnish extra materials, from the same product run, that match products installed and that opened and left over, and identified with labels describing contents.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced Applicator who has completed painting system applications similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Source Limitations: Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.6 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.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

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EXTERIOR PAINTING

- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures 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. Benjamin Moore & Co.
 - 2. PPG Architectural Finishes, Inc. (Pittsburgh Paints, Glidden Professional, Flood Stains)
 - 3. Sherwin-Williams Company (The).
- B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, 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: As selected by Architect from manufacturer's full range.
 - 1. Allow for up to 5 different color selections.

2.3 METAL PRIMERS

- A. Galvanized Metal Primer: Factory-formulated galvanized metal primer for exterior application.
 - 1. Benjamin Moore; Moore's IMC Acrylic Metal Primer No. M04.
 - 2. Pittsburgh Paints: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel. (123 g/L)
 - 3. Sherwin-Williams; IMC DTM Acrylic Primer/Finish, B66W1. (150 g/L)

2.4 EXTERIOR LATEX PAINTS

- A. Semi-Gloss Acrylic Latex Paint:
 - 1. Moore: Super Spec Latex House & Trim Paint #170.
 - 2. PPG: Speedhide Exterior Semi-Gloss Latex, 6-900XI Series. (<50 g/L)
 - 3. S-W: SuperPaint Exterior Latex Gloss, A84 Series. (132 g/L)

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EXTERIOR PAINTING

- B. Exterior Semi-Gloss Acrylic Enamel: Factory-formulated semi-gloss acrylic enamel for exterior application.
 - 1. Benjamin Moore; DTM Acrylic Semi-Gloss Enamel M29: Applied at a dry film thickness of not less than 2.0 mils.
 - 2. Pittsburgh Paints: 6-900XI Speedhide Exterior Semi-Gloss Latex: Applied at a dry film thickness of not less than 1.5 mils.
 - 3. Sherwin-Williams; IMC DTM Acrylic Coating Semi-Gloss (Waterborne) B66W200 Series. (250 g/L)

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. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- D. 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 in "MPI Architectural Painting Specification Manual" 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.
- 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.

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EXTERIOR PAINTING

- D. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- E. Wood Substrates:
1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 2. Sand surfaces that will be exposed to view, and dust off.
 3. Prime edges, ends, faces, undersides, and backsides of wood.
 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- F. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
1. Blast steel surfaces clean as recommended by paint system manufacturer and according to treatments of SSPC-SP 10
 2. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 3. Touch up bare areas and shop-applied prime coats that been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
 4. Piece Marks: Remove piece marks or numbers and characters that identify components for erection prior to field painting. Applying a primer over the marks is also acceptable.
- G. Galvanized Surfaces: Clean galvanized surfaces with a palm sander and 60 grit sandpaper so surface is free of surface contamination. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- H. Fiberglass Doors and Frames: Follow manufacturer's finish instructions for cleaning all surfaces.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 4. Paint entire exposed surface of window frames and sashes.
 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

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EXTERIOR PAINTING

- B. Tinting: Tint primer of colors such as reds, yellows, and oranges with a gray basecoat system designed to help provide color coverage.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces. When using colors such as red, yellow or orange, an extra coat of finish may be necessary. Notify Architect when additional coats do not fix the problem.
- 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 to view:
 - a. Equipment, including panelboards and switch gear.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- 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.

3.5 EXTERIOR PAINTING SCHEDULE

- A. Fiberglass Doors and Exterior Wood Trim:
 - 1. Primer: Exterior Latex Primer
 - 2. Intermediate and Top Coats: Exterior Latex, Semigloss
- B. Fiber-Cement Panels and Soffit:
 - 1. Primer: Exterior Latex Primer
 - 2. Top Coat: Exterior Latex, Semigloss
- C. PVC Trim Panels:
 - 1. Primer: Exterior Latex Primer
 - 2. Top Coat: Exterior Latex, Semigloss
- D. Ferrous Metal

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EXTERIOR PAINTING

1. Primer: Rust-inhibitive metal primer (not required on shop-primed items)
2. Intermediate and Top Coat: Exterior Alkyd enamel, semigloss

END OF SECTION 099113

SECTION 09 91 23
INTERIOR PAINTING

SECTION 099123 - 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. Solvent-based finish coatings.
 - 4. Floor sealers and paints.
 - 5. 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.
- E. Product Schedule: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

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.

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INTERIOR PAINTING

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.

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. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.
 1. Benjamin Moore & Co.
 2. PPG Industries, Inc.
 3. Sherwin-Williams Co.
- B. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, GENERAL

- A. Material Compatibility:

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INTERIOR PAINTING

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: As selected by Architect from manufacturer's full range

2.3 PRIMERS

- A. Interior, 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. Moore: Pristine Eco Spec Interior Latex Sealer, No. 231
 2. PPG: Pure Performance Primer/Sealer 9-900 Series
 3. SW: Harmony Interior Latex Primer B11W900 Series

2.4 WATER-BASED FINISH COATS

- A. Interior, Latex, Eggshell: Pigmented, water-based paint for use on primed/sealed interior plaster and gypsum board, and on primed wood and metals.
1. Moore: Pristine Eco Spec Interior Latex No. 223
 2. PPG: Pure Performance Interior Latex, 9-300 Series
 3. SW: Harmony Interior Latex, B9 Series
 4. Gloss and Sheen Level: Manufacturer's standard eggshell finish

2.5 DRY FALL COATINGS

- 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. Gloss and Sheen Level: Manufacturer's standard flat finish.

2.6 POLYURETHANE VARNISH

- A. High-Performance, water-based polyurethane sealer, satin finish
1. Moore: Benwood Stays Clear Acrylic Polyurethane varnish, low luster, No. 423
 2. SW: Mixwax Performance Series Waterbourne Polyurethane, Satin 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.

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INTERIOR PAINTING

- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Fiber-Cement Board: 12 percent.
 - 2. Wood: 15 percent.
 - 3. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. 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. Provide barrier coats over incompatible primers or remove and reprime.
- G. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

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- H. Fiberglass Doors and Frames: Follow manufacturer's finishing instructions for cleaning all surfaces.

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. Other items as directed by Architect.
 - 2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

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

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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

- A. Gypsum Board Substrates:
 - 1. Ceiling Finish:
 - a. Prime Coat: Interior Latex Primer
 - b. Intermediate and Finish Coat: Latex based interior paint, flat finish
 - 2. Wall Finish:
 - a. Primer Coat: Interior Latex Primer
 - b. Intermediate and Finish Coat: Latex based interior paint, eggshell finish

3.7 WASTE MANAGEMENT

- A. Separate clean waste products from contaminants for recycling in accordance with the Waste Management Plan and place in designated areas for recycling.
- B. Place materials defined as hazardous or toxic waste in designated containers.
- C. Return solvent and oil soaked rags for contaminant recovery and laundering or for proper disposal.
- D. Do not use kerosene or any such organic solvents to thin or clean up paints.

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INTERIOR PAINTING

- E. Do not dispose of paints or solvents by pouring on the ground. Place in designated containers for proper disposal.
- F. Where paint recycling is available, collect all waste paint by type and provide delivery to recycling or collection facility.
- G. Close and seal tightly all partly used sealant containers and store in well-ventilated, fire-safe area at moderate temperature.
- H. Place used sealant tubes and containers in areas designated for hazardous materials.

END OF SECTION 099123

SECTION 09 93 00
STAINING AND TRANSPARENT FINISHING

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:

1. Interior Substrates:

- a. Dressed lumber (finish carpentry or woodwork).
- b. Windows.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- D. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- E. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
1. Indicate VOC content.
- B. Samples for Initial Selection: For each type of product.
- C. Samples for Verification: For each type of finish system and in each color and gloss of finish required.
1. Submit Samples on representative samples of actual wood substrates, 8 inches square or 8 inches long.
 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.
- D. Product List: Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

SECTION 09 93 00
STAINING AND TRANSPARENT FINISHING

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.
- B. Furnish extra materials, from the same product run, that match products installed and that opened and left over, and identified with labels describing contents.

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 finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures less than 5 deg F above the dew point, or to damp or wet surfaces.
- C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. California Paints.
 - 3. PPG Architectural Finishes, Inc. (Pittsburgh Paints, Glidden Professional, Flood Stains, Sikkens)
 - 4. Samuel Cabot Incorporated.
 - 5. Sherwin-Williams Company (The)
- B. Products: Subject to compliance with requirements, provide one of the products listed in wood finish systems schedules for the product category indicated.

SECTION 09 93 00
STAINING AND TRANSPARENT FINISHING

2.2 MATERIALS, 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 manufacturers of topcoat for use in paint system and on substrate indicated.

B. Stain Colors: As selected by Architect from manufacturer's full range.

2.3 STAINS

A. Interior Wood Stain (Semitransparent): E3 VOC

1. PPG: Olympic Premium Interior Oil-Based Wood Stain 44500
2. Glidden Professional: 1700V, Woodpride Interior Wood Stain
3. S-W: Minwax Interior Oil Stain - 250 Formula, 7107/7108 Series.

2.4 WATER-BASED VARNISHES

A. Waterborne Clear Acrylic (Satin):

1. Ben Moore: Lenmar Aqua Plastic Waterborne Clear Satin, 1WB-1427.
2. PPG: Olympic 42786 Interior Acrylic Polyurethane Satin Clear Finish.
3. S-W: Minwax Polycrylic.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content, lighting levels and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Interior Wood Substrates: 10 percent, when measured with an electronic moisture meter.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

SECTION 09 93 00
STAINING AND TRANSPARENT FINISHING

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 - 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.
 - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- D. Interior Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces exposed to view and dust off.
 - 3. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dry.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for finish and substrate indicated.
 - 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
 - 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

SECTION 09 93 00
STAINING AND TRANSPARENT FINISHING

- C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 EXTERIOR WOOD FINISH SYSTEM SCHEDULE

- A. Wood Substrates
 - 1. Water-Based Varnish over Stain System
 - a. Stain Coat: Stain, semitransparent
 - b. First and Second Intermediate Coats: Polyurethane varnish matching topcoat
 - c. Topcoat: Varnish, water based, clear, satin (MPI Gloss Level 4)

3.6 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

- A. Wood Substrates: Wood trim and windows.
 - 1. Water-Based Varnish over Stain System:
 - a. Undercoat: None
 - b. Stain: None
 - c. First and Second Intermediate Coats: Polyurethane varnish matching topcoat
 - d. Topcoat: Varnish, water based, clear satin (MPI Gloss Level 4)

END OF SECTION 099300

SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Private-use bathroom 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 Submittals: For each product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify accessories using designations indicated.

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.

SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 2 - PRODUCTS

2.1 PRIVATE-USE BATHROOM ACCESSORIES

- A. Bobrick products are listed in each category as basis of design unless noted otherwise.
- B. Toilet Tissue Dispenser:
 - 1. Products: Available products include the following:
 - a. Bobrick Bo. B-6857
 - 2. Type: Surface mounted single roll dispenser
 - 3. Mounting: Surface mounted with concealed anchorage
 - 4. Material: Stainless steel, satin finish
 - 5. Spindle: Chrome plated finish with heavy-duty internal spring.
- C. Towel Bars:
 - 1. Products: Available products include the following:
 - a. Bobrick No B-530 Series
 - b. Stainless Steel Nominal Thickness: 18-gauge
 - c. Outside Diameter: 1 inch for heavy-duty applications
 - d. Lengths: As indicated on drawings.
- D. Robe Hook:
 - 1. Products: Available products include the following:
 - a. Bobrick B-76717
 - b. Single Prong Unit: Stainless steel, satin finish, single prong robe hook with rectangular wall bracket and backplate for concealed mounting.
- E. Recessed Medicine Cabinet:
 - 1. Products: Available products include the following:
 - a. Jensen Model 530924
 - b. Overall size: 24 inch by 30 inch by 4 7/8 inch
 - c. Construction: steel with two adjustable glass shelves, piano hinge and float glass mirror with frameless beveled edge. Door reversible for left or right hand operation.

2.2 MATERIALS

- A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch- minimum nominal thickness.
- C. 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.
- D. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).

SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

- E. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.3 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.

PART 3 - EXECUTION

3.1 INSTALLATION

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

END OF SECTION 102800

SECTION 11 30 13
RESIDENTIAL APPLIANCES

SECTION 113013 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cooking appliances.
2. Kitchen exhaust ventilation.
3. Refrigeration appliances.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Cooking appliances.
2. Kitchen exhaust ventilation.
3. Refrigeration appliances.

B. Product Data Submittals: For each product.

1. Include installation details, material descriptions, dimensions of individual components, and finishes for each appliance.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

C. Product Schedule: For appliances Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Certificates: For each type of appliance.

C. Field quality-control reports.

D. Sample Warranties: For manufacturers' special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

SECTION 11 30 13
RESIDENTIAL APPLIANCES

1.5 QUALITY ASSURANCE

- A. Product Options: Appliance requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Products section.
 - 1. Other manufacturers' products with equal characteristics may be considered. See Division 1 Section "Product Requirements"
- B. Manufacturer's Qualifications: Manufacturer regularly engaged, for past 20 years, in manufacturing of residential appliances of similar type to the specified.
- C. Installer's Qualifications: Employ persons trained for installation of residential appliances.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

2.2 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 COOKING APPLIANCES

- A. Electric Range Slide-in range with one oven and complying with AHAM ER-1.
 - 1. Products: Available products include the following:
 - a. Whirlpool model WSES3130SW
 - 2. Width: 30 inches
 - 3. Electric Burner Elements: Four.
 - 4. Color: White
 - 5. Oven Features:
 - a. Capacity: 5.3 cu. Ft.
 - b. Operation: Baking
 - c. Broiler: Located in top of oven
 - d. Electric Power Rating:
 - 1) Oven: 2400 W
 - 2) Broiler: 3400 W
 - 6. Anti-Tip Device: Manufacturer's standard.
 - 7. Electric Power Supply: 40A, 60HZ, 208V, 12W

2.4 KITCHEN EXHAUST VENTILATION

- A. Overhead Exhaust Hood

SECTION 11 30 13
RESIDENTIAL APPLIANCES

1. Products: Available products include the following:
 - a. Whirlpool model UXT2030ADW
2. Dimensions:
 - a. Width: 30 inches.
3. Exhaust Fan: Two-speed fan built into hood and with manufacturer's standard capacity.
 - a. Venting: As indicated on Drawings
 - b. Fan Control: Hood-mounted touch-pad to control fan switch, with separate hood-light control switch.
4. Duct Type: As indicated on Drawings
5. Finish: Baked enamel
 - a. Color: White
6. Features:
 - a. Permanent, washable manufacturer's standard filter(s).
 - b. Built-in LED lighting.

2.5 REFRIGERATION APPLIANCES

- A. Refrigerator/Freezer Two-door refrigerator/freezer with freezer on top and complying with AHAM HRF-1.
- B. Products: Available products include the following:
 1. Whirlpool model WRT311FZDW
 2. Type: Freestanding
 3. Dimensions:
 - a. Width: 32 inches
 - b. Depth: 32 inches
 - c. Height: 66 1/4 inches
 4. Refrigerator Features:
 - a. Interior light in refrigeration compartment.
 - b. Compartment Storage: vegetable crisper and meat compartment
 - c. Door Storage: Modular compartments
 5. Freezer Features: One freezer compartment with door
 - a. Automatic defrost.
 - b. Interior light in freezer compartment.
 6. Energy Star: Provide appliances that qualify for the EPA/DOE Energy Star product-labeling program.
 7. Front Panel(s): Manufacturer's standard

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RESIDENTIAL APPLIANCES

a. Panel Color: White

8. Appliance Color/Finish: White

2.6 INSTALLATION

- A. Install appliances according to manufacturer's written instructions.
- B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- D. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

2.7 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections
 - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- B. An appliance will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 113013

SECTION 12 35 30
RESIDENTIAL CASEWORK

SECTION 123530 - RESIDENTIAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Kitchen and vanity cabinets.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood blocking for anchoring casework.
2. Section 123623.13 "Plastic-Laminate-Clad Countertops."

1.2 DEFINITIONS

- A. Concealed Surfaces of Casework: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, bottoms of drawers, and ends of casework installed directly against and completely concealed by walls or other casework, and tops of wall cabinets and utility cabinets.
- B. Exposed Surfaces of Casework: Surfaces visible when doors and drawers are closed, including visible surfaces in open cabinets or behind glass doors.
- C. Semiexposed Surfaces of Casework: Surfaces behind opaque doors or drawer fronts, including interior faces of doors, interiors and sides of drawers, and bottoms of wall cabinets.

1.3 COORDINATION

- A. Coordinate layout and installation of blocking and reinforcement in partitions for support of casework.

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 casework.
2. Include rated capacities, operating characteristics, profiles, and finishes for hardware.

B. Shop Drawings: For residential casework.

1. Include plans, elevations, details, and attachments to other work.
2. Show materials, finishes, filler panels, and hardware.
3. Indicate manufacturer's catalog numbers for casework.

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RESIDENTIAL CASEWORK

- C. Samples: For casework and hardware finishes.
- D. Samples for Initial Selection: For casework and hardware finishes.
- E. Samples for Verification: For the following:
 - 1. Casework Finishes: 8-by-10-inch Samples for each type of casework finish.
 - 2. Hardware: One full-size Sample of each type of exposed hardware in each finish required.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Certificates: For casework.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Provide fillers and scribes to allow for trimming and fitting.
- 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.

PART 2 - PRODUCTS

2.1 CABINETS

- A. Wood-faced Manufactured Casework:
 - 1. Basis of Design Product: Subject to compliance with requirements
 - a. Shiloh Cabinetry.
 - b. Approved equal.
- B. Quality Standard: Provide cabinets that comply with KCMA A161.1.
 - 1. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location of each unit and showing compliance with KCMA A161.1.

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RESIDENTIAL CASEWORK

- C. Door Face Style: Recessed flat panel-in-frame
- D. Drawer Face Style: Flat panel
 - 1. Door and Drawer Fronts:
 - a. Solid hardwood 3/4 inch thick. Mortis and tenon or bore and dowel construction frame joinery with glue and nail. Stiles 1 1/2 inch wide. Mullions, 3 inch wide. Rails 1 3/4 inch wide. Stiles and top and bottom rails dadoed to receive ends, tops and bottoms.
- E. Exposed Cabinet End Finish: Wood veneer
- F. Cabinet End Construction: Nominal 1/2 inch multi-ply, type 1, exterior glue hardwood plywood, dadoed to receive tops and bottoms. Ends inserted into dado in face frame and recessed 3/16 inch and rabbeted to receive backs.
- G. Cabinet Tops and Bottoms: Nominal 3/8 inch thick, multi-ply, hardwood plywood. Tops and bottoms fitted into end panels, front rails and hang rails, glued and fastened. Bottoms supported at rear of base by nominal 1/2 thick hardwood plywood
- H. Wall-Hung-Unit Hanging Rails: Nominal 3/4 inch thick by 3 inch high hardwood plywood, running full cabinet length at the top and bottom
- I. Base Cabinet Hanging Rails: Nominal 3/4 inch thick by 7 1/4 inch high solid pine at top. All hang rails are rabbeted to inset in end panels and receive back.
- J. Back Panels: Nominal 3/8 inch thick hardwood plywood securely glued and fastened to rabbets in ends and hang rails.
- K. Shelves: Nominal 1/2 inch hardwood plywood, 10 7/8 inch deep, with hardwood veneer banded front edge. Shelves are fixed into dadoes in end panels on all cabinets.
- L. Toe Boards: Nominal 1/2 inch thick ACQ pressure treated plywood captured between end panels.
- M. Base Corner Braces: Two 3/4 inch by 1 1/2 inch solid hardwood or hardwood plywood corner braces running full depth front to back of cabinet. All braces glued and fastened at top of cabinet to front frame, rear hanging rails and end panels.
- N. Drawers: Solid pine lumber, 5/8 inch thick, four-sided drawer box with 1/4 inch bottom. Ends captured in drawer side dadoes. Drawer bottoms nominal 1/4 inch thick hardwood plywood dadoes into all four drawer box sides. All draw parts glued and fastened together.
- O. Joinery: Rabbet backs flush into end panels and secure with concealed mechanical fasteners. Connect tops and bottoms of wall cabinets and bottoms and stretchers of base cabinets to ends and dividers with mechanical fasteners. Rabbet tops, bottoms, and backs into end panels.
- P. Door Style: Hamlin

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2.2 CABINET MATERIALS

- A. Hardwood Lumber: Kiln dried to 7 percent moisture content.
- B. Softwood Lumber: Kiln dried to 10 percent moisture content.
- C. Hardwood Plywood: HPVA HP-1.
- D. Exposed Materials:
 - 1. Exposed Wood Species: White Oak
 - a. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
 - b. Staining and Finish
 - 1) Exterior: factory finished catalyzed conversation varnish topcoat.
 - 2) Interior: Factory laminated.
 - 2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.
 - 3. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C backs of same species as faces.
- E. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility; particleboard; MDF; or hardboard.

2.3 CABINET HARDWARE

- A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish as selected by Architect from manufacturer's full range.
- B. Pulls: Solid aluminum or chrome-plated brass wire, 4 inches long, 3/8 inch diameter, fastened from back with two screws.
 - 1. Basis-of-Design Product: Ives #38
 - 2. Or approved equal.
- C. Hinges: Concealed, heavy-duty high quality steel, adjustable with self-closing feature.
- D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.
- E. 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.

SECTION 12 35 30
RESIDENTIAL CASEWORK

EXECUTION

2.4 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 casework.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

2.5 INSTALLATION

- A. Install casework with no variations in adjoining surfaces; use concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework.
- B. Install casework without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.
- C. Install casework level and plumb to a tolerance of 1/8 inch in 8 feet.
- D. Fasten casework to adjacent units and to backing.
 - 1. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c.
 - a. Fasteners: No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

2.6 ADJUSTING AND CLEANING

- A. Adjust hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
- B. Clean casework on exposed and semiexposed surfaces. Touch up as required to restore damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 123530

SECTION 12 36 23.13
PLASTIC-LAMINATE-CLAD COUNTERTOPS

SECTION 123623.13 – PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad countertops.
2. Accessories.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Plastic-laminate-clad countertops.
2. Accessories.

B. Product Data Submittals: For each product.

C. Shop Drawings: For plastic-laminate-clad countertops.

1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
2. Show locations and sizes of cutouts and holes for items installed in plastic-laminate-clad countertops.

D. Samples: Plastic laminates in each type, color, pattern, and surface finish required in manufacturer's standard size.

E. Samples for Initial Selection: For plastic laminates.

F. Samples for Verification: As follows:

1. Plastic Laminates: For each type, color, pattern, and surface finish required, 8 by 10 inches in size.
2. Fabrication Sample: For each type and profile of countertop required, provide one sample applied to core material with specified edge material applied to one edge.

1.3 INFORMATIONAL SUBMITTALS

A. Product Certificates: For the following:

1. Composite wood products.
2. High-pressure decorative laminate.

SECTION 12 36 23.13
PLASTIC-LAMINATE-CLAD COUNTERTOPS

3. Chemical-resistant, high-pressure decorative laminate.
4. Adhesives.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 1. Shop Certification: AWT's Quality Certification Program accredited participant
- B. Installer Qualifications: AWT's Quality Certification Program accredited participant

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.
- B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- C. Keep surfaces of countertops covered with protective covering during handling and installation.

1.6 FIELD CONDITIONS

- A. Environmental Limitations without Humidity Control: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Environmental Limitations with Humidity Control: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity within the manufacturer's approved percentage during the remainder of the construction period.
- C. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- D. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

SECTION 12 36 23.13
PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.
 - 1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that countertops comply with requirements of grades specified.
 - 2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Grade: Premium
- C. High-Pressure Decorative Laminate: ISO 4586-3, NEMA LD 3, grades as indicated or, in not indicated, as required by woodwork quality standard.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include, but not limited to, the following
 - a. Formica Corporation
 - b. Lamin-Art, Inc.
 - c. Nevamar Company
 - d. Panolam Industries International Inc.
 - e. Westinghouse Electrical Corp.
 - f. Wilsonart International
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As selected by Architect from manufacturer's full range
 - a. .
- E. Edge Treatment: Same as laminate cladding on horizontal surfaces
- F. Core Material: Particleboard or MDF
- G. Core Material at Sinks: Particleboard made with exterior glue, MDF made with exterior glue, or exterior-grade plywood
- H. Core Thickness: 3/4 inch
 - 1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.
- I. Paper Backing: Provide paper backing on underside of countertop substrate.

SECTION 12 36 23.13
PLASTIC-LAMINATE-CLAD COUNTERTOPS

2.2 MISCELLANEOUS MATERIALS

- A. Adhesive for Bonding Plastic Laminate: as selected by fabricator to comply with requirements.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive
- B. Installation Adhesive: Do not use adhesives that contain formaldehyde
 - 1. VOC Limits for Installation Adhesive and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Wood Glues: 30 g/L
 - b. Contact Adhesive: 250 g/L

2.3 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:
 - 1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended, and check measurements of assemblies against field measurements before disassembling for shipment.
- D. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of cutouts by saturating with varnish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing.

SECTION 12 36 23.13
PLASTIC-LAMINATE-CLAD COUNTERTOPS

3.2 INSTALLATION.

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.

Retain first subparagraph below if openings in countertops are field cut.

- 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
 - 1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical-treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
 - 2. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semiexposed surfaces.

SECTION 12 36 23.13
PLASTIC-LAMINATE-CLAD COUNTERTOPS

- C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 123623.13

SECTION 31 20 00 – EARTH MOVING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Trench & structure excavation in earth and ledge.
- B. Grubbing, stripping and stockpiling of topsoil.
- C. All excavation and earthwork required for site work and sub-grade preparation.
- D. Backfilling of structures, trenches, facilities and excavations.
- E. Preparation of subgrades, backfill and bedding materials.
- F. Rip-Rap placement.

1.2 GENERAL REQUIREMENTS

- A. Section refers to Maine Department of Transportation Standard Specifications (MDOTSS), latest edition, as modified by the latest Supplemental Specifications.
- B. Unit prices for rock excavation are included in Price and Payment Procedures or are considered incidental to the contract.
- C. Unauthorized excavation consists of excavation below that required under the contract or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
- D. Notify utility locator service for area where Project is located before site clearing.
- E. All timber and wood shall become the property of the Contractor unless other arrangements have been made between the Owner and the Contractor.
- F. Strip all topsoil from within construction limit lines and stockpile in areas approved by Engineer. Surplus topsoil, gravel or suitable backfill material shall not be removed from the site unless/until approval is received from the Engineer. This shall not relieve the Contractor of his responsibility to remove unsuitable material or excess suitable material from the site when so directed by the Engineer. Owner shall retain ownership of excess (not re-used on site) topsoil. Other excess material on the site shall become the property of the Contractor.
- G. Do not interrupt existing utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.

- H. Rip-rap shall include furnishing all labor, equipment, and materials and performing all work necessary to place a protective covering of erosion-resistant material on the slopes of embankments, culvert inlets and outlets, and stream-banks. The work shall be in conformity with the lines and grades shown on the plans.
- I. Perform all de-watering necessary to maintain excavated areas free from water from any source.
- J. All work shall be performed and completed in conformance with all applicable local, State & Federal requirements. Specifically, permits obtained by the Owner and including requirements for construction are incorporated into these specifications and shall be implemented by the Contractor.
- K. Do not begin site-clearing operations until temporary erosion and sedimentation control measures are in place. Temporary erosion and sedimentation control measures shall be maintained until the site is permanently stabilized with regard to erosion, at which point the Contractor shall remove them.

1.3 SURVEYING AND LAYOUT

- A. The Contractor shall employ, within the contract price, a competent survey foreman, to: verify all locations, lines, grades, property lines, work lines and provide layout as required to complete the work according to the Drawings and Specifications.
- B. The Drawings indicate, in general, the alignment and grades of the work. The Engineer, however, may require the Contractor to make adjustments in grades and alignment as necessary during the performance of the work. Grading between indicated final grades shall be smooth, even surfaces, except as otherwise required.
- C. The Contractor shall establish the lines and grades in conformity with the Drawings and maintain same by means of suitable stakes or battens to properly perform the contract installation.
- D. Protect and maintain benchmarks and survey control points from disturbance.

1.4 DISPOSITION OF UTILITIES

- A. The locations of utilities shown on the plan are approximate as determined from physical evidence on or above the surface of the ground and from information supplied by the utilities. The Engineer in no way warrants that these locations are correct. It shall be the responsibility of the Contractor to determine the actual locations of any utilities within the project area.
- B. Rules and regulations governing the respective utilities shall be observed in executing all work in this Section. Active utilities shall be adequately protected from damage and removed or relocated only as indicated or specified. Inactive and abandoned utilities encountered in excavation and grading operations shall be removed, plugged or capped. Such abandoned utilities shall be noted on the record drawings. Extreme care shall be taken when performing work in the vicinity of existing utility lines, utilizing hand excavation in such areas, as far as practicable. If, in the progress of excavation, any utility should become damaged and result in

any damage to public or private property, the General Contractor shall restore to the original condition, at no additional cost to the Owner, anything which has been damaged or disturbed.

- C. Follow all regulations and requirements of the governing utility authority (i.e., water district, electric company, municipal public works, state agency, etc.) whenever utilities are encountered during the work on this project.

1.5 QUALITY ASSURANCE

- A. Regulatory agencies, codes & standards

All work shall be performed in accordance with all applicable local, State or federal regulations and requirements, including Occupational Safety standards. The Owner shall secure required permits for the work. Contractor shall provide submittals for all erosion control mats, both temporary and permanent as well as other materials or equipment specified in these specifications.

- B. Soil testing and inspection

Contractor shall provide soil testing and quality control testing during earthwork operations from an independent testing entity acceptable to both the Owner and the Contractor. The cost of all testing shall be borne by the Contractor. Contractor shall obtain and submit to the Engineer the test results for every soil proposed to meet specified material or to be used within the project, prior to such material being used on the project. These tests shall include:

1. Optimum moisture-density curve as determined by ASTM D 1557 (modified proctor)
2. Sieve analysis as determined by ASTM C-117 & C-136

1.6 SUBMITTALS

- A. Comply with Submittal section of these specifications with regard to process and quantity of submittals.

- B. Submittals shall be prepared for items including, but not limited to:

1. Soil gradations
2. Soil density tests (modified proctors)
3. Geotextile Fabrics
4. Erosion Control fabrics, fences, inlet protection devices

1.7 EXCAVATION PROTECTION

- A. Provide shoring, sheeting, bracing and protection at all excavations as required to prevent cave-ins of excavation and to assure complete safety of existing structures, utilities and pavements that are to remain in place.
- B. Comply with all local, State and/or Federal safety regulations as well as good construction practice.

- C. Completely fill with suitable material and thoroughly compact all voids left by the removal of sheeting. Where sheeting is to be left in place, obtain written permission from the Engineer to do so.

1.8 PROTECTION OF PERSONS AND PROPERTY

- A. The Contractor shall be responsible to ensure that all persons and property are adequately protected. Open excavations shall be barricaded and posted with warning lights from dusk to dawn and as otherwise required by the Engineer. The public, structures, utilities, traffic, sidewalks, pavements and other facilities shall be protected from damage caused by settlement, lateral movement, undermining, washout and any other hazard created by the earthwork operations. Protect all existing trees, shrubs and plantings. Tree trunks shall be protected by substantial boxing to prevent damage.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 6 inches in any dimension, debris, waste, frozen materials, vegetation, or other deleterious matter.
- B. Unsatisfactory Soil: ASTM D 2487 Soil Classification Groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.
- C. Sub-base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; MDOT 703.6 (c) Type D; with the following gradation:

<u>Sieve Designation</u>	<u>% by Weight Passing Square Mesh Sieves</u>
½"	35-80
¼"	25 – 65
No. 40	0 – 30
No. 200	0 – 7.0

Aggregate for subbase shall not contain particles of rock which will not pass the 6 in. square mesh sieve.

- D. Base Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; MDOT 703.06(a) Type B meeting the following gradation:

<u>Sieve Designation</u>	<u>% by Weight Passing Square</u>
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	<u>Mesh Sieves</u>
½”	35 - 75
¼”	25 - 60
No. 40	0 - 25
No. 200	0 – 6.0

Aggregate for base shall not contain particles of rock which will not pass the 2 in. square mesh sieve. (This is modified from standard MDOT spec)

- E. Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; MDOT 703.22, Type B underdrain material meeting the following gradation:

<u>Sieve Designation</u>	<u>% by Weight Passing Square Mesh Sieves</u>
1”	95-100
½”	75 - 100
No. 4	50-100
No. 20	15-80
No. 50	0-15
No. 200	0-5.0

- F. Underdrain Backfill Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; MDOT 703.22, Granular Material for Type B underdrain meeting the following gradation:

<u>Sieve Designation</u>	<u>% by Weight Passing Square Mesh Sieves</u>
1”	95 – 100
1/2”	75 – 100
No. 4	50 – 100
No. 20	15 – 80
No. 50	0 – 15

No. 200	0 – 5.0
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- G. Crushed Stone, unwashed: Narrowly graded mixture of unwashed crushed stone, suitably graded from 1/8" to 3/4" in size. Mixture shall have some fines to help prevent water flow along the installed pipe lines.
- H. Crushed Stone, washed: crushed, screened and washed durable stone of a consistent 3/4" in size, unless otherwise noted on the plans or in the specifications.
- I. Sand: Course to fine sand aggregate shall be of hard, durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances and meeting the requirements of MDOT 703.05.
- J. Geotechnical Fabric (woven): Fabric shall be as called for on the plans as governed by MDOT section 722.04. Material shall be Class 1. Basis of Design: Mirafi 600x
- K. Geotextile Fabric (non-woven): At drains or other locations where non-woven fabric is called for on the plans, or in these specifications, the fabric used shall comply with MDOT 722.02, Class 2. Basis of Design: Mirafi 160N.
- L. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below.
 - 1. Type IV, 25 psi
 - 2. Basis of Design: DuPont Styrofoam Scoreboard Insulation

PART 3 - EXECUTION

3.1 SOILS APPLICATIONS

- A. The soils listed in Part 2 shall be used in the following areas unless otherwise noted on the plans or modified herein:

<u>Application</u>	<u>Soil Material to be used</u>
HDPE piping smaller than 4" (1 foot around pipe)	Sand
HDPE piping 4" and larger bedding & initial fill	Bedding

Final Trench Backfill to subgrade elevation	Material taken from trench shall be re-used or Satisfactory Soil
Under utility Structures	Crushed Stone, washed
Copper and HDPE water services (1 foot around pipe)	Sand
Trench Backfill (Final Backfill)	Satisfactory Soil
Road Base	Base Material
Road Subbase	Subbase Material
Backfill at foundations, piers & posts	Subbase Material (4" minus)
12" directly under slab-on-grade and under foundations	Base Material
Drains	Washed, crushed stone (3/4")
Locations Calling for Crushed Stone	Washed unless specifically noted otherwise

3.2 EARTHWORK

- A. Protect and maintain erosion and sedimentation controls, which are specified and as specified on the plans, during earthwork operations.
- B. Protect subgrades and foundation soils from softening and damage by water, freezing temperatures, or frost.
- C. Embankments and sub-grade shall be built and prepared according to MDOT Standard Specifications Sections 203.10, 203.11, 203.16 & 203.17. Any soft spots discovered during proof rolling and/or compaction shall be excavated, removed and replaced with satisfactory material.
- D. Stockpile satisfactory excavated materials and materials supplied for the project where directed until required. Place, grade and shape stockpiles for drainage and protect from erosion if they will be left more than 10 days.

- E. Excavate for structures, pavements, and walkways. Trim subgrades to required lines and grades. Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock.
 - 1. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without direction of the Engineer. Unauthorized excavation as well as remedial work directed by the Engineer shall be done at the Contractor's expense. Unauthorized excavations shall be backfilled and compacted as specified for authorized excavations of the same classification unless otherwise directed by the Engineer.
 - 2. Additional Excavation: If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the Engineer.
- F. Utility Trenches: Excavate trenches to indicated slopes, lines, depths, and invert elevations. Maintain 12 inches of working clearance on each side of pipe or conduit.
 - 1. Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
 - 2. Place and compact initial backfill of specified material, free of particles larger than 1 inch, to a height as detailed over the utility pipe or conduit. Place and compact final backfill, utilizing material removed from the trench to final subgrade.
- G. Plow strip or break up sloped surfaces steeper than 1 vertical to 4 horizontal to receive fill.
- H. Grade areas to a smooth surface to cross sections, lines, and elevations indicated. Grade lawns, walkways, and unpaved subgrades to tolerances of plus or minus 1 inch and pavements and areas within building lines to plus or minus 1/2 inch.
- I. Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

3.3 BACKFILL & COMPACTON

- A. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface, pulverize, moisture-condition or aerate soil, and recompact. Soil that has been removed because it is too wet to permit compaction may be stockpiled or spread to dry. Assist drying by discing, harrowing or other methods to reduce moisture level to that required.
- B. Deposit backfill material evenly on all sides of structures to avoid unequal soil pressures.
- C. Do not allow large masses of backfill material to be dropped into the excavation in such a manner that may endanger pipes and structures.
- D. Provide and place backfill and fill in layers not more than 8 inches in loose depth at optimum moisture content. Compact each layer under structures, building slabs, pavements, and walkways to the specified percent of maximum dry unit weight.
- E. Compaction: Compact top 12" of subgrade and each successive layer of fill to 95% of maximum dry density. Field density tests shall be provided in accordance with ASTM D1556 or

ASTM D6938 methods. They shall be provided, as a minimum, at the following locations, frequency and meeting the following requirements:

1. One test per each 8" lift for every 2000 sf, or one test per 200 linear feet, or one test per lift, whichever is greater will be required for areas under tank.
- F. Allow testing agency to inspect and test each subgrade and each fill or backfill layer and verify compliance with requirements. Contractor shall be responsible for the cost of compaction testing. Testing of material placed under tank floor shall be required at least two times.
- G. Under pavements and walkways, place subbase course material on prepared subgrades and compact at optimum moisture content to required grades, lines, cross sections, and thicknesses.
- H. Improper Backfill: When excavation and trenches have been improperly backfilled, and/or when settlement occurs, reopen the excavation to the depth required, as directed by the Engineer. Refill and compact the excavation or trench with suitable material and restore the surface to the required grade and condition. Excavation, backfilling, compacting work and testing performed to correct the improper backfilling shall be performed at no additional cost to the Owner.

3.4 EXCAVATION PROTECTION

- A. Provide shoring, sheeting, bracing and protection at all excavations as required to prevent cave-ins of excavation and to assure complete safety of existing structures, utilities and pavements that are to remain in place.
- B. Comply with all local, State and/or Federal safety regulations as well as good construction practice.
- C. Completely fill with suitable material and thoroughly compact all voids left by the removal of sheeting. Where sheeting is to be left in place, obtain written permission from the Engineer to do so.

3.5 DEWATERING

- A. Furnish, operate and maintain dewatering equipment for control, collection and disposal of ground and surface water as required.
- B. The dewatering system shall consist of pumps, drains, well points, piping and any other facilities necessary to keep the excavations and trenches free from water. Dewatering shall be considered incidental to the contract unless specifically designated otherwise in the Contract Documents.
- C. Water pumped or drained from the site shall be disposed of in a suitable manner so as to avoid public nuisance, injury to the public health, damage to public or private property and/or damage to work completed or in progress.
- D. Design, construct and remove cofferdams where necessary for dewatering, control and diversion of water to keep excavations and trenches free of water. Cofferdams shall be designed

to withstand all imposed loads to prevent injury to persons or property. Cofferdams shall be removed after the completion of permanent construction unless specifically directed otherwise in writing by the Engineer.

- E. Damage resulting from dewatering operations, or the failure of the Contractor to maintain the work in a suitable dry condition shall be repaired, to the satisfaction of the Engineer, at no additional cost to the Owner.

3.6 WEATHER CONSIDERATIONS

- A. The site soils are moisture-sensitive and therefore, construction activity should be limited during wet and freezing weather and the site soils may require drying before construction activities may continue.
- B. The contractor should anticipate the need for water to temper fills in order to facilitate compaction during dry weather.
- C. If construction takes place during cold weather, subgrades and foundations must be protected during freezing conditions. Concrete and fill must not be placed on frozen soil; and once placed, the concrete and soil beneath the structure must be protected from freezing.

END OF SECTION 31 20 00

SECTION 31 24 00 – ROADWAY, ACCESS AND PARKING CONSTRUCTION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Construction of roads, parking areas and travelled ways shall meet or exceed the requirements of this section.
- B. Submittals: Provide submittals for equipment or materials defined in this, or other sections of these specifications.
- C. Comply with MDOT Standard Specifications (MDOTSS), latest edition for minimum standards unless specifically modified on the drawings or in these specifications.
- D. Comply with MDOT Standard Details (MDOTSD), latest edition for minimum standards unless specifically modified on the drawings or in these specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Hot Mix Asphalt: See HOT MIX ASPHALT PAVEMENT section.

PART 3 - INSTALLATION

3.1 ROADWAY EXCAVATION

- A. Roadway excavation shall meet the requirements of MDOTSS Section 203.05.
- B. Boulder removal: Boulders shall be removed completely for a depth of 36" from the top of the gravel base elevation. Boulders that extend deeper than 36" from the top of the gravel base layer shall be drilled and shattered to a depth of 48" below the top elevation of the base layer. The shattered material shall be removed and replaced with similar, compacted, boulder free material from the adjacent areas.
- C. Common Excavation required to reach subgrade shall include the removing and disposing of boulders, rocks, soil and soft disintegrated rock which can be removed by ordinary excavating machinery. It shall include grubbing, which consists of the removing and disposing of all stumps, roots, bushes, grass, turf or other objectionable material and it shall include berm ditches and cut slopes. It shall also include muck removal, which consists of removing and disposing of saturated or unsaturated mixtures of soils and organic matter not suitable for embankment foundation material regardless of moisture content.
- D. Subgrades shall be proof-rolled and any soft spots, as determined by the Engineer shall be dug out and replaced with compacted material similar to the surrounding material.

3.2 PROTECTION OF SUBGRADE

- A. The subgrade shall be brought to a condition of uniform stability and compacted for the full width of the roadway by grading an rolling operation and shall be maintained to no tolerance above or 3" below the required grade and cross section. The surface shall be compacted to uniform density and stability and graded to the extent that puddles of water will not form.
- B. The Contractor shall protect the subgrade from damage. Ditches and drains along the roadway shall be maintained to effectively drain the subgrade. In no case shall vehicles be allowed to travel in a single track and form ruts. No material shall be deposited on a subgrade until the subgrade has been approved.

3.3 AGGREGATE BASE AND SUBBASE COURSE

- A. The maximum compacted thickness of any aggregate subbase or aggregate base course layer shall not exceed 12 inches unless the Contractor demonstrates by a test section that the required compaction can be obtained. If compacted layers more than 12 inches are allowed, the Contractor shall agree to make the necessary excavations and backfilling in the course for density tests to be obtained.
- B. Each layer of aggregate shall be placed over the full width of the section except, the Engineer may authorize the Contractor to place less than full width layers, when existing traffic or other conditions restrict operations over the full width of the section. When the Contractor places material to complete the full width, the exposed edge of the previously placed aggregate shall be cleaned of all contamination before additional base or subbase aggregate is placed adjacent to it.
- C. The material as spread shall be well mixed with no pockets of either fine or coarse material. Segregation or large or fine particles will not be allowed.
- D. Compaction of each layer shall continue until a density of not less than 95% of the maximum density has been achieved for the full width and depth of the layer. The surface, compaction and stability, shall be satisfactorily maintained until the pavement course has been placed. If required, additional water and fine material shall be applied to prevent checking, raveling or rutting.
- E. If the top of any layer becomes contaminated by degradation of the aggregate or addition of foreign material, the contaminated material shall be removed and replaced with the specified material.
- F. All layers of aggregate subbase course shall be compacted to the required density immediately after placing. As soon as the compaction of any layer has been completed, the next layer shall be placed unless otherwise authorized.
- G. The Contractor shall bear full responsibility for and make all necessary repairs to the subbase course and the subgrade until the full depth of the subbase course is placed and compacted. Repairs shall be considered incidental to the contract price.
- H. The completed surface of the subbase or base course shall be shaped and maintained to a tolerance, above or below the required cross sectional shape of 3/8".

END OF SECTION 31 24 00

SECTION 31 25 00 – TEMPORARY EROSION and POLLUTION CONTROL

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Provide all labor, equipment, materials and maintain temporary erosion control devices as specified herein and as shown on the Drawings.
- B. Standards:
 - 1. Maine Department of Environmental Protection (MDEP), “Maine Erosion and Sediment Control BMPs”, October 2016 or current edition.
 - 2. Maine Department of Transportation Standard Specifications (MDOTSS), March 2020 Edition, as modified by the latest Supplemental Specifications.
 - 3. MDEP Chapter 500 Stormwater Management; Appendixes A, B & C
 - 4. MDEP Stormwater Management Law Permit Approval (See Appendix)
- C. Submittals: Contractor shall furnish to the Engineer, in writing, his Erosion and Sediment Control Plan including proposed locations for storage of topsoil and excavated material before beginning construction. The plan shall also include an erosion control sequence and description of measures to be used to mitigate temporary erosion and shall meet the requirements of the MDEP standard noted above. A schedule of work shall accompany the work plan. Acceptance of this plan will not relieve the Contractor of the responsibility of completion of the work as specified.
- D. Provide such erosion control measures as may be necessary to correct conditions that develop prior to the completion of permanent erosion control devices or as required to control erosion that occurs during normal construction operations.
- E. Provide and maintain erosion control devices to protect stormwater treatment installed in sitework contract. Ensure no earthwork materials or equipment storage occurs where stormwater treatment is located.
- F. Construction operations shall comply with all federal, state and local regulations pertaining to erosion control.
- G. Contractor shall designate a Maine DEP Certified Erosion Control Practitioner (CECP) responsible for implementation and oversight of erosion control measures.
- H. After awarded the Contract, prior to commencement of construction activities, meet with the Engineer to discuss erosion control requirements and develop a mutual understanding relative to details of erosion control.
- I. The plans and specifications provide direction and methods which should and will be used, however these may not be all-inclusive and other methods and Best Management Practices (BMP's) may be required. The Contractor shall, at least weekly, review the site and the

protection measures being used and determine if they are adequate to meet the requirement of minimizing erosion and preventing off-site sedimentation.

- J. Erosion control devices include, but are not limited to, silt fences, filter barriers, stone check dams, hay bales, sand bags, landscaping, and similar items. The extent of erosion control is only partially shown on the Drawings. The Contractor shall also furnish and install all erosion control measures, which are required by other related authorities, such as DEP, local boards, and all other similar entities.
- K. The Contractor shall follow the conditions of any State permitting with regard to sedimentation and erosion control. A log of erosion control device inspections and measures taken to improve such shall be maintained by the Contractor for the duration of the project. This maintenance log shall be produced by the Contractor upon request by the Owner, City or MDEP.
- L. Design Criteria
 - 1. Conduct all construction in a manner and sequence that causes the least practical disturbance of the physical environment.
 - 2. Stabilize disturbed earth surfaces in the shortest time and employ such temporary erosion control devices as may be necessary until such time as adequate soil stabilization has been achieved.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stone: Stone for use in stone check dams shall conform to MDOT 703.24 and shall be a clean material with no fines and be of hard, durable rock and shall conform to the following table:

<u>Sieve Designation</u>	<u>% by Weight Passing Square Mesh Sieves</u>
6"	90-100
1 ½"	0-40
No. 4	0-5

- B. Temporary Erosion Control Blankets: Photodegradable, polypropylene top & bottom net with 100% straw fiber matrix. Basis of Design: North American Green Ero Net S150 or equal
- C. Water: Contractor shall provide water and equipment to control dust, as required by job conditions.
- D. Inlet protection devices: "Dandy Bags", as manufactured by Dandy Products; Grove City, Ohio 43123, www.dandyproducts.com.

- E. Dewatering Bags: Dandy Dewatering Bags, as manufactured by Dandy Products; Grove City, Ohio 43123, www.dandyproducts.com.

1. The inlet protection unit shall be a sewn in the U.S.A. geotextile fabric unit fitted to the individual grate(s) and completely enclosing the grate(s).
2. The Bag shall have lifting devises to allow manual inspection of the storm water system.
3. The Bag unit shall utilize an orange monofilament fabric manufactured in the U.S.A. with the following characteristics:

PROPERTY	TEST METHOD	UNITS	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.62 (365) x 0.89 (200)
Grab Tensile Elongation	ASTM D 4632	%	24 x 10
Puncture Strength	ASTM D 4833	kN (lbs)	0.44 (100)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	3097 (450)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.51 (115) x 0.33 (75)
% Open Area	COE -22125-86	%	10
Apparent Opening Size	ASTM D 4751	mm (US Std Sieve)	0.425 (40)
Permittivity	ASTM D 4491	Sec 1	2.14
Permeability	ASTM 4491	cm/sec	0.142
Water Flow Rate (gal/min/ft ²) 5607 (145)	ASTM 4491	l/min/m ² (gal/min/ft ²)	5607 (145)
Ultraviolet Resistance	ASTM D 4355	%	70
Color			Orange

- F. Mulch

1. Straw mulch shall consist of long fibered straw derived from oats, wheat, rye or other cultivated grains, reasonable free from weeds and other undesirable material. No material shall be used which is so wet, decayed or compacted as to inhibit even and uniform spreading. No chopped hay, grass clippings, or other short fibered material shall be used unless directed.
2. Cellulose fiber mulch shall consist of elongated wood fibers from virgin or recycled sources and post consumer newsprint. The woods fibers shall be tested to show no lead, asbestos or other heavy metals exceeding EPA toxic levels. Cellulose fiber mulch shall be free of refuse, physical contaminants, and material toxic to plant growth. Cellulose fiber shall not contain more then 30% post-consumer newsprint.

- G. Mulch Binder: Shall consist of a commercially developed product for the tacking of hay or straw. Binder shall be free of refuse, physical contaminants, material toxic to plant growth, or asphalt. Paper fiber mulch may be used as a binder at the rate of 3 kg /m² [0.6 lb/ ft²]. Paper fiber mulch shall consist of 100% post consumer newsprint processed to be applied hydraulically.

- H. Silt Fence shall meet the requirements of AASHTO M-288.

- I. Perimeter Sediment Control Socks and Wattles/logs (silt fence alternative):

1. Coir Fiber Logs: Coir fiber logs shall be new, 12" diameter, 9 pound per cubic foot density, with a poly netting and come in 10' sections.
 2. Filter Socks: The filter sock shall be produced from 5 mil thick continuous HDPE filament, woven into a tubular mesh netting material with openings in the knitted mesh of 3/8". This shall then be filled with compost meeting the specifications outlined in the 2003 AASHTO Provisional Standards, manual MP 9-03. Filter sock netting material shall be biodegradable. Unless otherwise noted socks shall be 8" in diameter. Install per manufacturers recommendations. Basis of Design: Filtrexx Silt Soxx.
- J. Mulch Berms: Berms shall be constructed from stump grindings which have sufficient earth mixed with the woody material to provide adequate flow retardance to water. Wood chips without earth mixed in are insufficient to provide adequate sedimentation barriers.

PART 3 - EXECUTION

3.1 NARRATIVE

- A. Erosion will be controlled with two main methods. The first shall be to reduce initial erosion by protecting bare soils. Regular mulching shall be applied throughout construction to minimize initial disturbance and soil particle suspension in water run-off. The secondary method shall be to control and catch sediment which may become suspended in the run-off. This shall be done through the use of stone check dams, silt fence and sedimentation collection areas. Areas cleared of woody vegetation and roots will have this vegetation ground, mulched and then used to create berms through which storm water can percolate.

3.2 INSTALLATION

- A. Temporary Erosion Checks: Construct temporary erosion checks in ditches and other locations as indicated on the drawings or directed by the Engineer.
- B. Perimeter sediment control materials (silt socks, coir wattles, silt fence) shall be installed per manufactures instructions. Socks or wattles shall be staked to the ground as required but in no case at intervals less than 10' on center and with 12" stake depth into the soil.
- C. Any disturbed areas to be left in rough graded form for more than 30 days but less than one growing season shall be limed, fertilized, temporary seeded and mulched.
- D. All disturbed areas shall be stabilized with lime, fertilizer, seed and mulch at the completion of the project. Permanent seeding shall meet the requirements of the seeding portion of the specifications and be based on the anticipated use. Permanent seeding shall be installed immediately upon reaching final grade.
- E. After seeding, areas disturbed shall be mulched as described in MDOTSS section 619. Hay shall not be used. Straw shall be used.

- F. Temporary construction entrances shall be constructed at all locations used for access to or from the site. The entrance shall be built of 1 ½" crushed stone, the full width of the access and at least 50' in length or as detailed on the drawings.
- G. Weekly, or after precipitation producing the equivalent of one half inch of rainfall or snowmelt, all mulched areas shall be inspected for suitability for erosion control and slope protection. Weakened areas shall be re-mulched as noted above.
- H. Every week and after precipitation producing the equivalent of one half inch of rainfall, the contractor shall inspect and maintain all erosion control measures. Maintenance shall include, but not be limited to removal of sediment from silt fence or berms if soil accumulates to a depth of one-half the fabric height: repair of stone check dams if runoff channelizes under or around the stone: removal of excess accumulated sediment from dewatering and inlet protection devices: and washing of temporary construction entrances.
- I. Erosion control mat shall be installed on all slopes in excess of 3:1 (H:V).
- J. When permanent soil stabilization has been achieved, such temporary materials and devices that are unsightly in appearance or not readily degradable shall be removed..
- K. Reuse: Materials and devices of suitable type and condition may be reused at other on-site locations when approved by the Engineer. Materials and devices, determined by the Engineer to be unsuitable for reuse, shall become the Contractor's property and shall be disposed of in a manner and location approved by the Engineer.
- L. Dewatering bags shall be removed from the site and disposed of in manner meeting State, local and Federal requirements.

3.3 MULCHING

- A. Straw mulch for both seeded and unseeded areas shall be spread evenly and uniformly over the designated areas. Unless otherwise directed, mulch shall be applied at the rate of 1.5 ton to 2 ton/acre. Too heavy an application of mulch shall be avoided. Lumps and thick mulch material shall be thinned.
- B. Unless otherwise authorized, straw mulch shall be anchored in place by uniformly applying an acceptable mulch binder. Mulch binder shall be applied as soon as the mulch is placed. Application of a concentrated stream of mulch binder will not be allowed. Mulch binder will be paper fiber mulch applied at 5 lbs/Unit or approved equal. Water spray may be used as a temporary binder.
- C. Temporary mulching shall be applied as required to maintain proper erosion control and seed cover, spread immediately to protect soil from erosion during all stages of construction throughout all seasons of the year.
- D. Cellulose Fiber Mulch shall be applied as a waterborne slurry. The cellulose fiber and water shall be thoroughly mixed and sprayed on the area to be covered so as to form a uniform mat of mulch at the rate of not less than 40 lb of mulch material per 1000 ft² unit of area.

- E. Cellulose fiber mulch may be mixed with the proper quantities of seed, fertilizer, and agricultural limestone as required may be applied separately the same day as seeding.
- F. The Contractor shall maintain the straw or fiber mulch by repairing all damaged mulch and by correcting all shifting of the mulch due to wind, water, or other causes, until an acceptable growth of grass has been achieved.
- G. If cellulose fiber mulch is used, any reseeding will require additional cellulose fiber mulch.

3.4 OVERWINTER CONSTRUCTION

- A. If construction occurs after **November 1st**, all disturbed areas should be stabilized daily if the construction is active. Any erosion or discharges should be repaired immediately.
- B. No more than 1 acre should be actively worked on at any one time without regular inspection; or the exposed area should be limited to which can be mulched in one day. Any measures necessary to control erosion/sedimentation should be installed for the conditions at the site (soil erodibility, slope, groundwater, size, weather conditions, etc.).
- C. For over-winter protection, a **double row of sediment barriers** (silt fence backed with hay bales or erosion control mix, etc.) should be placed within 75 feet of a protected natural resource.
- D. All **hay mulch** should be anchored with netting, asphalt emulsion chemicals, tracking or erosion control mix after November 1st. The ground surface should be invisible under the mulch.
- E. **Loam or seed** is not effective after October 15. Finished areas can be mulched without seeding or with dormant seeding applied at 3 times the specified rate for permanent seeding. All areas seeded during the winter should be inspected in the spring and revegetated if the catch is less than 75 %.
- F. All vegetated **areas with a slope of 15% or less** should have 90% grass cover by November 1st or should be seeded with winter rye at a seeding rate of 3 pounds per 1000 square feet, mulched with hay at 75 pounds per 1000 square feet, and anchored with netting. Or, by November 15, the area should be protected with an erosion control blanket, erosion control mix, or with hay at a rate of at least 150 pounds per 1000 square feet.
- G. All vegetated **slopes greater than 15%** should be seeded and mulched by September 1. If a slope is not stabilized by October 15, the soil may be seeded with winter rye at a seeding rate of 3 pounds per 1000 square feet and protected with erosion control blankets. If the rye fails to grow three inches or fails to cover at least 75% of the slope by November 15, the slope should be protected with an erosion control blanket, erosion control mix, or riprap.
- H. All **grass-lined ditches and channels** should be constructed and stabilized by September

- I. If a ditch or channel is not sufficiently grassed over (75% cover) by November 15th, the ditch should be lined with stone riprap. The ditch will need to be over-excavated to accommodate the thickness of the riprap.
- J. **Soil stockpiles** should be mulched for over winter protection with hay at twice the normal rate or with a four-inch layer of erosion control mix. Stockpiles should not be left overwinter (even mulched) if within 100 feet from a protected resource.

3.5 EQUIPMENT & FUELING

- A. Minimum equipment/vehicle fueling and maintenance practices that will be implemented to control pollutants to stormwater (e.g., secondary containment, drip pans, spill kits, etc.)
- B. Equipment Fueling - Equipment is to be fueled in designated areas on site. Fueling equipment is to be maintained according to OSHA regulations. Spill cleanup materials are to be provided by the operators of the equipment or the owners of the fueling equipment. Cleanup materials are to be present near the fueling area and clearly labeled.
- C. Equipment Repair and Maintenance - Unless vehicle cannot be moved without incurring further damage, no repairs are to occur on site. If a machine is creating a pollution problem, it must be removed from the site. No equipment will be permitted on site that is leaking any fuels, fluids or lubricants. Any and all routine maintenance is to occur offsite.
- D. Maintenance and Inspections shall occur daily

3.6 SPILL PREVENTION AND CONTROL

- A. All chemical agents are to be stored in OSHA and DOT approved containers, if applicable. All chemicals are to be stored in a safe manner, and stored in a secondary containment unit whenever possible (i.e. fuel cabinet, concrete spill containment tank, etc.) Cleanup materials are to be present near the chemical storage area and clearly labeled. Spill cleanup materials are to be provided by the owner of the material.
- B. In the event of a spill, superintendent is to be notified of spill immediately. Spill is to be contained as quickly as possible, with provided cleanup materials. Spilled materials must be prevented from entering stormwater system. In the event of a spill for which there are inadequate cleanup materials, spill is to be contained with earth dikes until other measures can be implemented. Spilled chemicals and cleanup materials are to be isolated and disposed of according to Superintendent's instructions. Superintendent is to post and maintain a contact list of disposal resources in job trailer. Included in this list shall be emergency contact numbers for the manufacturers of any material brought on site by any subcontractor.
- C. Contractor will be responsible for response training for all employees on the site, as well as the foreman of each subcontractor on site. Foreman of subcontracting companies will be responsible for training each of their own workers in spill response. Subcontractors are to provide Superintendent with written confirmation that this training has been performed.

END OF SECTION 31 25 00

SECTION 32 12 16 – HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and hot-mix asphalt design mixes.
- B. Provisions of the General Conditions, Division 1 apply to this section.
- C. Provide hot-mix asphalt paving according to standard specifications of Maine Department of Transportation, Division 400. Where the “Department” is referenced, it shall be construed to read the “Owner”.
- D. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot Mix Asphalt Pavements," unless more stringent requirements are indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by MDOT.
 - 1. Binder Course: HMA 19 mm Superpave
 - 2. Surface Course: HMA 9.5 mm Superpave
 - 3. Sidewalks: HMA 9.5 mm Superpave
- B. Tack Coat: AASHTO M 208, cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- C. RAP for Asphalt Pavement: Recycled Asphalt pavement may be used in hot-mix asphalt as allowed in section 703.08 of MDOTSS.

PART 3 - EXECUTION

3.1 PAVING

- A. Batch plants, paving equipment and paving procedures shall conform to MDOT Specification sections 401.02 through 401.18 and Section 403.01 thru 403.03. Quality Control Method “D” acceptance limits from section 401.204 shall be used unless otherwise noted. If the mix is outside the acceptance limits the Owner may require the removal of all the mix and require re-paving at the Contractors expense.
- B. Tack coat existing asphalt or concrete surfaces and allow tack coat to cure undisturbed. Tack shall be required prior to placement of any bituminous material upon a lower course unless prior

course has been placed within 2 days and is, in the Engineer's opinion sufficiently clean. Bituminous tack coat shall meet MDOT specification requirements of section 409. The applied rate shall be 0.025 gal/yd².

- C. Place hot-mix asphalt to required grade, cross section, and thickness. Promptly correct surface irregularities in paving course.
 - 1. Spread mix at minimum temperature of 275 deg F.
- D. Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers. Complete compaction before mix temperature cools to 185 deg F.
- E. Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness.
- F. Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to 92 percent of reference maximum theoretical density according to ASTM D 2041.
- G. Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- H. Remove and restore paved areas that are defective or contaminated.
- I. Trench paving: Pavement in trenches shall be of the same thickness as adjacent pavement but no less than 3" in any case.

3.2 PAVEMENT MARKING

- A. Apply pavement-marking paint with mechanical equipment as specified in MDOT specification section 627.
- B. All pavement markings shall be dimensioned and sized to meet the requirements of the Manual on Uniform Traffic Control Devices as approved by the Federal Highway Administration.

END OF SECTION 32 12 16

SECTION 32 92 00 - LAWNS AND GRASSES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Certification of grass seed, product certificates and planting schedule.
- B. Planting Restrictions: Plant during one of the following periods.
 - 1. Spring Planting: April 15 to July 15
 - 2. Fall Planting: September 1 to October 15
- C. Maintain lawn/seeding until established, but for not less than 30 days.

PART 2 - PRODUCTS

2.1 GRASSES

- A. Seed Species: State-certified seed of grass species, as follows:
 - 1. Seed Species: Seed of grass species as follows:
 - Percent Germination > 80%
 - Pure Live Seed > 85%
 - Percent Purity > 85%
 - Weed seed < 1%
- The seed mixture shall consist of the following proportions by weight:
- | | |
|---------------------|-----|
| Creeping Red Fescue | 45% |
| Kentucky Bluegrass | 25% |
| Chewings Fescue | 15% |
| Perennial Ryegrass | 10% |
| Annual Ryegrass | 5% |

2.2 SOILS AND AMENDMENTS

- A. Topsoil: Soils meeting the requirements of MDOT section 615.
- B. Lime: ASTM C 602, Class T, agricultural limestone.
- C. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8.
- D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
- E. Commercial Fertilizer: Commercial-grade complete fertilizer, consisting of 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

- F. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium; 20 percent nitrogen; 10 percent phosphorous; and 10 percent potassium; by weight.
- G. Straw Mulch: Clean, mildew- and seed-free salt hay or threshed straw of wheat, rye, oats, or barley.
- H. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5. Meeting requirements of MDOT section 619.

PART 3 - EXECUTION

3.1 PREPARATION

- A. See MDOT specification sections 615, 616, 618 & 619 for approved procedures and methods.
- B. Loosen subgrade to a minimum depth of 4 inches, remove stones, sticks, existing grass, vegetation, and other extraneous materials.
 - 1. At newly graded subgrades, spread planting soil mix to a depth of 3 inches but not less than required to meet finish grades.
 - 2. At unchanged grades, apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.
- C. Grade lawn areas to a smooth, even surface with loose, uniformly fine texture. Moisten before planting.

3.2 PLANTING

- A. Seeding Methods shall be as described in MDOTSS section 618.01 unless noted otherwise.
- B. Seeding: Evenly distribute seed by sowing with a spreader or a seeding machine. Rake seed lightly into top 1/8 inch of topsoil, roll lightly, and water with fine spray. Protect seeded areas by spreading straw mulch 1-1/2 inches in loose depth.
 - 1. Seeding Rate: 3 to 4 lb/1000 sq. ft. or appropriate MDOT specification.
- C. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Uniformly blended into a homogeneous slurry.
 - 1. Apply slurry uniformly at a rate so that mulch component is deposited at no less than 1700-lb/acre dry weight, and seed component is deposited at no less than the specified seed-sowing rate.
 - 2. Seeding Rate: 3 to 4 lb/1000 sq. ft.
- D. Sodding: Lay sod within 24 hours of harvesting. Lay sod with tightly fitted joints, offsetting joints in adjacent courses. Tamp and roll lightly. Fill minor cracks between pieces of sod with

soil or sand. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples. Saturate sod with fine water spray within two hours of planting. During first week, water daily.

- E. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn. Provide materials and installation the same as those used in the original installation.
- F. Mow lawn as soon as top growth is tall enough to cut. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

END OF SECTION 32 92 00

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SECTION 33 10 00 - WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: This Section includes water-distribution piping for water mains, water services and fire-service mains.
- B. Submittals shall be supplied for all pipe, valves, fittings, stops, boxes, tapping sleeves and similar items. Submittals shall be provided with sufficient time for the Engineer to review and comment on such prior to their use in the field.
- C. The local Water District shall be notified prior to any work being performed on District water mains. The Contractor shall give adequate notice to the Water District of proposed work to be done so that the District can be present during such work and the Contractor shall coordinate all such work with the District. No valves or water system elements shall be operated without the Water Districts approval.
- D. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- E. Comply with NFPA 24, "Standard for the Installation of Private Fire Service Mains and Their Appurtenances," for materials, installations, tests, and flushing.
- F. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on applicable piping.
- G. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.
- H. Existing water services to be replaced or discontinued shall be removed and/or capped as directed by the local utility to prevent contamination of the public system.
- I. Provisions of the General Conditions, Division 1 apply to this section.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Soft Copper Tube: Copper tubing shall meet the requirements of Federal Specification WW-T and shall conform to ASTM B-75, B 88 and B-68 as they apply to Type K Copper Tubing.
 - 1. Brazing Filler Metals: AWS A5.8, BCuP Series.
 - 2. Solder Filler Metal: ASTM B 32, lead-free type with 0.20 percent maximum lead content.
- B. Bronze Fittings: Service Brass must conform to AWWA Standard C-800 (latest revision) and pack joint end connections shall consist of a Buna-N beveled gasket for water-tight seal. An

independent, split-clamp locking device or stainless steel beveled gripper shall be incorporated in the design for additional restraint. Fitting shall be lead-free per NSF 372.

PART 3 - EXECUTION

3.1 GENERAL

- A. Operate no valves without permission from the utility
- B. Ensure that all exposed fittings, new and existing, are thrust blocked or otherwise restrained prior to backfilling.
- C. Excavate and determine size and materials of existing piping prior to ordering materials when connecting to existing mains.

3.2 WATER SERVICES

- A. All water services shall consist of a corporation stop, curb stop and service box unless they are large enough for a tapping sleeve and valve to be designated. Services shall be tested, cleaned and disinfected prior to acceptance by Owner.
- B. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- C. Connect water system piping and water-supply source and building water-distribution at the building wall in locations and pipe sizes indicated.
- D. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight.
- E. Bury piping with depth of cover over top at least 72 inches with top at least 12 inches below level of maximum frost penetration, unless insulation is provided.
- F. Install continuous underground detectable warning tape during backfilling of trench for underground water-service piping. Locate below finished grade, directly over piping.

3.3 ABANDONED UTILITIES

- A. All services, mains to be abandoned shall be capped and abandoned in place, unless otherwise noted. Ends which are disconnected shall be fitted with water tight caps compatible with the material being capped.
- B. Existing water main being abandoned shall be left in the trench without disturbance and buried.
- C. Existing valves or corporation stops shall be abandoned and their valve boxes and curb stops removed so that they are not detectable from the ground surface

END OF SECTION 33 10 00

SECTION 33 30 00 - SANITARY SEWER UTILITIES & STRUCTURES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Items to be submitted include: pipe, fittings, frames, covers and other similar items.
- B. Work includes new services and interception of existing mains.
- C. Testing shall be performed at a time approved by the Engineer. Contractor shall provide all labor, pumps, pipe, connections, plugs, gauges and necessary equipment to conduct tests.
- D. Sewers shall be built to the standards of "Guides for the Design of Wastewater Works" TR-16 prepared by the New England Interstate Water Pollution Control Commission unless specifically modified on the drawings or in these specifications.
- E. Provisions of the General Conditions, Division 1, Allowances and Submittal Requirements apply to this section.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. PVC Sewer Pipe and Fittings: Pipe shall conform to ASTM D 3034, SDR 35, with bell/spigot gasketed joints. Rubber gaskets shall conform to ASTM D 3212 and F 477. Pipe shall be colored green to identify it for sewer applications.
- B. All fittings shall be of the wide sweep type.
- C. Sleeves for piping, such as with directional boring shall be of adequate size to allow the installation and removal of the utility line and be HDPE 4710 unless otherwise noted or required by MDOT.
- D. Services: New sewer services shall be gasketed 90° or 45° wyes, appropriate adapters, fittings and service pipe. Services on existing lines shall be made with saddles having hardware of Type C304L stainless steel or silicon bronze. Services shall be 4" unless otherwise noted.

2.2 ACCESSORIES

- A. Service markers and locator: 3M Mid-range marker, model #1258 and ScotchMark EMS II Marker Locator or equal. **Contractor shall provide markers and locator as part of contract price.**
- B. Clean out Boxes and covers: Sewer cleanout boxes and covers shall be cast iron with solid covers with the words "Sewer" or "Cleanout" on the cover. Boxes and covers shall be sized to

accommodate the cleanout fittings covered. Basis of Design: Neenah Foundary R1970 to R-1977 Series.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install cleanout and extension to grade at connection of building sanitary drain and building sanitary sewer. Provide cleanout box and cover over all cleanouts located outside of the building.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream.
- C. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated, with 36-inch minimum cover.
- D. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated.
- E. Pipe shall be straight and free from defects. Pipe which is not straight or is defective shall be removed from the site and not used.

3.2 INSTALLATION

- A. Install PVC pipe and gasketed fittings with gaskets according to ASTM D 2321.
- B. All pipe, fittings and joints shall be cleaned of dirt and debris prior to placement.
- C. The bell of pipe shall be lubricated according to the manufacturers recommendations prior to joining.
- D. Joints shall be firmly pushed together without damaging the pipe, gasket, fittings or bells.
- E. Pipe shall be firmly supported on bedding material. Bedding material shall be shaped so that only the barrel of the pipe has bearing pressure from bedding material (not joints).
- F. Use a laser beam aligner for grade and alignment. Pipe shall be laid from the lowest point to the highest. Bell end of pipe shall be placed on the upstream end.
- G. Perform all cutting with machines designed to cut the material being cut. Do not use a hammer and chisel to cut pipe. Carefully chamfer all cut ends to be used with push-on joints to prevent damage to gaskets when pipe is installed. The ends of pipe shall be temporarily closed at open ends when work is not in progress. If trenches become filled with water, debris or soil such closed ends shall not be opened until the trench has been cleared. Pipelines may not be used as drainage structures for the trench.

3.3 CONNECTIONS TO EXISTING/OTHER MATERIAL PIPELINES

- A. All connections to existing sewer mains shall be done with couplings or at valves. The connection locations shall be restrained with mechanical fittings and concrete restraining blocks as shown on the drawings.

3.4 INSULATION

- A. Where cover over sewer or water mains is 5 feet or less (or where shown on the drawings), 2" extruded polystyrene foam plank insulation shall be installed. Insulation shall be at least 2 feet wider than the pipe diameter and shall be placed on compacted bedding material. At least 6" of clean sand shall be placed directly above the insulation.

3.5 FIELD QUALITY CONTROL AND TESTING – GENERAL

- A. All sewers, manholes, services and associated work shall be subjected to tests to determine horizontal and vertical alignment as well as water-tightness. All pipes and structures shall be cleaned prior to final approval.
- B. Thoroughly clean and flush all sewer lines to be tested, in a manner and to the extent acceptable to the Engineer, prior to initiating test procedures
- C. Testing shall be under the direct supervision of the Engineer or local Authority Having Jurisdiction. Test shall be at times and in patterns approved by Engineer.

3.6 FIELD QUALITY CONTROL AND TESTING – GRAVITY LINES

- A. Test all gravity sewer lines for leakage by conducting a low-pressure air test. Test shall be conducted after the tee or saddle and first section of service connection have been installed, but before backfilling the sewer line trench.
- B. Sewer Pipe Deflection Test: An in-place deflection test shall be performed on all PVC gravity pipe by drawing a gauge plug through each section of sewer. Equipment used shall meet the following minimum requirements:
 - 1. The gauge plug shall be constructed of durable, abrasion resistant material in a cylindrical shape. The full diameter barrel length to pipe diameter ratio shall not be less than 1.5 and the minimum barrel diameter shall be 5% less than the undeflected inside diameter of the pipe being tested. Each end of the cylinder shall be radiused at not less than $\frac{1}{4}$ of the pipe diameter being tested. Each gauge shall have a $\frac{1}{4}$ " tie rod drilled through the entire unit. Tie rod terminations shall be closed eyes.
 - 2. Pull cord shall be attached to the gauge eyes with safety snaps. This cord shall be high quality materials with a minimum test strength of 250 pounds. Cord on each side of the gauge shall be of sufficient length to span the maximum distance between any two adjacent manholes at the project site. This cord shall be marked in such a way that the user can determine the location of any constrictions found in

the line as the test is being performed. The gauge plug and pull cord shall be submitted to the Engineer for approval prior to use.

3. Pipe Deflection:

- a. Pipe provided under this specification shall be installed so there is no more than a maximum deflection of 5.0%. Such deflection shall be computed by multiplying the amount of deflection (normal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.
- b. The Contractor shall wait a minimum of 30 days after completion of a section of sewer, including placement and compaction of backfill, before measuring the amount of deflection by pulling a specially designed gage assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer and shall be acceptable to the Engineer.
- c. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem as the Engineer may require without additional compensation.

Procedure:

1. The deflection test shall be performed after the trench has been completely back-filled and adequate settlement of the area around the trench has occurred (not less than thirty (30) days following installation of the pipe).
 2. To perform this test, the gauge is inserted into the pipe at the upstream manhole and slowly drawn through the line to the downstream manhole. When a constriction is encountered the cord shall be pulled with a force not to exceed 100 pounds, until it can go no further. Location of the constriction shall be noted, the spindle shall be withdrawn to the upstream manhole, and the section of pipe shall be excavated to correct the problem. When the area around the new pipe section has adequately settled, the deflection test shall be performed again along the entire section where the constriction occurred.
 3. All deflection tests shall be conducted at all times in the presence of the Engineer. Results of tests performed in the absence of the Engineer will not be accepted.
- C. All deficiencies found during testing shall be remedied and then the tests re-performed. The costs of all testing and re-testing shall be the Contractors.
- D. Gravity Sewer lines shall be tested for leakage by conducting a low-pressure air test according to ASTM C828 for clay pipe, ASTM C924 for concrete pipe and ASTM F1417 for plastic pipe. This shall include the testing of service lines.

END OF SECTION 33 30 00

SECTION 33 40 00 – STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Items to be submitted include: Drain basin layouts, pipe, fittings, frames, structures, covers and other similar items. Prior to ordering catch basins the Contractor shall obtain field level information to establish rim elevations for each catch basin. Catch basin component submittal schedule shall include at a minimum: proposed rim elevations, riser ring thickness, individual height and size of all pre-cast sections, positioning (horizontal and vertical) of all pipe penetrations into the manhole, invert elevations of all pipes into the catch basin.
- B. Provisions of the General Conditions, Division 1, and Submittal Requirements apply to this section.

1.2 DESCRIPTION OF WORK

- A. This section applies to all piping and structures associated with the storm drainage and storm-water management system. Specific details and specifications are also shown on the drawings for treatment and conveyance systems.
- B. Soils associated with the storm-drainage systems are specified in the earthwork section and on the drawings.
- C. Bio-swales, Vegetated Underdrained Soil Filters and other similar storm-water treatment structures/devices require careful attention during construction. These areas are to be built at the completion of the construction phase when the site has been stabilized with regard to sedimentation and soil erosion. If these areas are constructed too early in the process the soil filter medias will clog from sedimentation and not work properly. The Contractor is responsible to time the construction of these items to keep clogging from occurring.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Corrugated PE Pipe and Fittings: Pipe culverts and storm drains so designated shall conform to the requirements of MDOTSSNB, Subsection 603 and 706.06. Corrugated Polyethylene Pipe used for Option III will meet the requirements of AASHTO M294 type S, Dual Wall. Corrugated Polyethylene Pipe (and fittings) for Underdrain shall conform to AASHTO M252, slot perforated, for 6 inch diameter or less and to AASHTO M294 for 12 inch to 30 inch. Pipe to be used for Underdrain Type C shall be perforated in accordance with the applicable requirements of AASHTO M36/M36M Type III, Class I perforations. Pipe shall be corrugated with an integrally formed smooth waterway and be non-perforated or perforated as indicated on the drawings. Installation shall include all necessary boots, gaskets and adapters required to provide a “soil-tight” connection at all manholes, joints and fittings. Pipe shall be ADS N-12

ProLink Ultra pipe with integral bell-and-spigot joint meeting the requirements of ASTM F 477 or approved equal.

- B. Special Pipe Couplings and Fittings: Rubber or elastomeric sleeve and band assembly fabricated to match OD of pipes to be joined, for non pressure joints.

2.2 UTILITY STRUCTURES

- A. In-line or Drain basins: Drain basins shall be thermo-molded PVC stock. Joint tightness shall conform to ASTM D3212. The pipe bell spigot shall be joined to the main body of the drain basin. Grates for surface drainage inlets shall be ductile iron and made specifically for each basin so as to provide a round bottom flange that closely matches the diameter of the surface drainage inlet. Grates for drain basins shall be capable of supporting H-25 wheel loading for heavy-duty traffic or H-10 loading for pedestrian traffic. Basins and covers shall be as provided by Nyloplast, a division of Advanced Drainage Systems, Inc. or approved equal. Covers shall be as indicated on the drawings and be ductile iron and locking.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream.
- B. Culverts shall be installed with an impervious trench dam or anti-seep collar within 5' of the invert in of the culvert.
- C. Install piping pitched at minimum slope of 1 percent and 36-inch minimum cover, unless otherwise indicated.
- D. Use drain basin for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing line is indicated.
- E. Install PE pipe and fittings according to ASTM D 2321. Join pipe, tubing, and fittings with couplings for soil tight joints according to manufacturer's written instructions. Install corrugated piping according to the PPI Handbook of PE Pipe Chapter 7 Underground Installation of PE Piping.
- F. All basins shall be cleaned of debris and sediment prior to final completion.

END OF SECTION 334000

SECTION 334600 - SUBDRAINAGE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Provisions of the General Conditions, Division 1, Allowances and Submittal Requirements apply to this section.
- B. Section refers to Maine Department of Transportation Standard Specifications (MDOTSS) latest edition.
- C. Section applies to drainage piping and techniques other than storm-water conveyance piping and specifically applies to foundation drains, utility structure drains and road/parking underdrains.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

- A. Corrugated HDPE Pipe and Fittings: Corrugated Polyethylene Pipe (and fittings) for Underdrain shall conform to AASHTO M252, slot perforated, for 6 inch diameter and less and to AASHTO M294 for 12 inch to 30 inch. Pipe to be used for Underdrain Type C shall be perforated in accordance with the applicable requirements of AASHTO M36/M36M Type III, Class I perforations. Pipe shall be corrugated with an integrally formed smooth waterway and be non-perforated or perforated as indicated on the drawings. Installation shall include all necessary boots, gaskets and adapters required to provide a “soil-tight” connection at all manholes, joints and fittings. Pipe shall be ADS N-12 ProLink Ultra pipe with integral bell-and-spigot joint meeting the requirements of ASTM F 477 or approved equal.
- B. Perforated PVC Pipe and Fittings: ASTM D 2729, 2000 psi, bell-and-spigot ends, for loose joints.

2.2 SOLID-WALL PIPES AND FITTINGS

- A. Corrugated HDPE Pipe and Fittings: Pipe culverts and storm drains so designated shall conform to the requirements of MDOTSS, Subsection 603 and 706.06 (special provisions). Corrugated Polyethylene Pipe used for Option III will meet the requirements of AASHTO M294 type S, Dual Wall. Pipe shall be corrugated with an integrally formed smooth waterway and be non-perforated or perforated as indicated on the drawings. Installation shall include all necessary boots, gaskets and adapters required to provide a “soil-tight” connection at all manholes, joints and fittings. Pipe shall be ADS N-12 ProLink Ultra pipe with integral bell-and-spigot joint meeting the requirements of ASTM F 477 or approved equal.

2.3 ACCESSORIES

- A. Special Pipe Couplings: ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, with corrosion-resistant metal tension band and tightening mechanism on each end.
 - 1. Sleeve for Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 2. Sleeve for Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- B. PVC Cleanouts: ASTM D 3034, PVC cleanout threaded plug and threaded pipe hub.
- C. Geotextile: Nonwoven fabric such as Mirafi 140N or equal.
- D. Soil Materials: Backfill, drainage course, impervious fill, and satisfactory soil materials are specified in Division 31 Section "Earth Moving."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Foundation Drainage Installation:
 - 1. Foundation drains shall be 4" perforated, PVC pipe unless otherwise noted on the plans.
 - 2. Place and compact impervious fill at least 6 inches deep and 12 inches wide on subgrade adjacent to bottom of footing.
 - 3. Place compacted layer of drainage course at least 4 inches deep over compacted subgrade where drainage pipe is to be laid.
 - 4. Encase pipe with sock-style geotextile filter fabric and install pipe or wrap non-woven geotextile around drainage course and pipe to completely enclose drainage course and pipe.
 - 5. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
 - 6. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.
 - 7. Fill to Grade: Place and compact impervious fill material over compacted drainage fill.
 - 8. Install rodent protection on all foundation drain outlets.
- B. Underdrain: Type B or C underdrain shall be constructed as specified in MDOT Standard Specifications, section 605. Type B shall be 6" HDPE pipe unless otherwise noted. Type C shall be pipe of size and type specified on the drawings. All "dead" ends of underdrain shall be capped with a cap fitting.
- C. Install piping beginning at low points of system at a minimum slope of 0.5 percent or as noted on the drawings. Bed piping with full bearing in filtering material.
- D. Testing: Test drain piping with water to ensure free flow before backfilling.
- E. Maintain swab or drag in piping with tight joints and pull past each joint as it is completed.

END OF SECTION 334600

SECTION 22 00 00 - PLUMBING GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SCOPE

- A. The Contractor shall furnish all labor, materials, equipment, transportation, permits, inspections, and incidentals required to install and complete all plumbing work as shown on the drawings or specified herein or both.
- B. All work shall be subject to the terms and conditions of the contract and applicable portions of the General Conditions and Special Conditions.
- C. All work and materials shall be in strict accordance with these drawings and specifications even though they may be in excess of the applicable codes, ordinances, and regulations.
- D. Whenever the word "provide" is used, it means furnish and install complete and ready for use.

1.2 DRAWINGS

- A. The general location of the apparatus and the details of the work are shown on the accompanying drawings, which form a part of this specification. Exact locations are to be determined at the building as the work progresses and shall be subject to the Owner's and or Engineer's acceptance.
- B. Anything shown on the drawings and not mentioned in the specifications or vice versa, shall be furnished as if it were both shown and specified.
- C. Due to the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. The Contractor will be required to investigate the structural and finish conditions affecting his work and shall arrange such work accordingly, furnishing such fittings, traps, valves, and accessories as may be required to meet such conditions.
- D. All questions as to the interpretation or extent of the drawings and specifications shall be referred to the Engineer. Failure to do this shall not relieve the Contractor of responsibility to provide all materials and work in accordance with the intent of these plans and specifications at no extra charge.

1.3 RECORD DRAWINGS

- A. The contractor shall maintain at site two separate sets of black line prints of the Plumbing Drawings. As the work progresses, he shall mark neatly and accurately all changes from the original layouts and the work accomplished day by day. Colors shall be used in marking the various services.

- B. These sets of prints will be inspected and considered a guide to determining the amount of work installed. If these drawings are found inaccurate or incomplete, they shall be corrected promptly. This procedure is mandatory and the Engineer will not review requisitions for payment until satisfied that this has been complied with and is up-to-date.
- C. These "As Built" drawings shall be turned over to the Engineer upon completion of the project for preparation of reproducibles by the Engineer for the Owners.
- D. Final payment will not be made until these "As Built" drawings have been received and accepted.

1.4 GENERAL CONDITIONS

- A. All materials entering into the installation must be new and of the quality specified, otherwise to be of the best commercial quality obtainable for the purpose. All parts of the work and the erection thereof must be performed in the best and most substantial manner in accordance with the standards of the trade and all applicable codes.
- B. The Contractor shall visit the site and building during construction and shall take such measurements as necessary for him to determine that actual conditions follow these plans and specifications such that he may properly install his work without interferences or work hold-ups.
- C. The Contractor shall study all drawings and specifications to determine any conflict with other trades. Any conflicts shall be submitted to the Engineer before starting work. The Architectural, Structural, Mechanical, and Electrical Drawings should be followed and this section of the work fitted thereto.
- D. Submittal of bid shall indicate that this Contractor has examined the site and drawings and has included all required allowances in his bid. No allowances shall be made for error resulting from Contractor's failure to visit job site and to review drawings.
- E. The Contractor shall be responsible for performing all operations in connection with this work and the satisfactory operation and tightness of all water, drainage, and venting systems under this contract.

1.5 CODES, PERMITS, INSPECTIONS

- A. The installation shall comply with all local laws applying to plumbing installations in effect at the site and regulations of any other Governmental body or agency having jurisdiction and with the regulations of the State of Maine Internal Plumbing Code, based on the 2021 Uniform Plumbing Code, where such regulations do not conflict with these laws.
- B. If there are any conflicts between the plans and/or specifications with the laws or local ordinances, the Contractor shall submit these conflicts to the Engineer before starting any work. Any work, done prior to this submittal, that needs to be changed to conform to these laws, ordinances or codes shall be made at the Contractor's expense.
- C. The Contractor shall obtain and pay for all permits, inspections, and licenses required.

- D. After completion of the work, the Contractor shall furnish to the Engineer for the Owner, a certificate of final inspection and acceptance from the inspector having jurisdiction.

1.6 EXTRA WORK ORDERS - CREDITS

No extra work will be paid for unless authorized by the Owner in writing. Where extra work is required, the Contractor shall provide an itemized account of the work involved and shall take into consideration any credits due or work omitted for any reason. Estimates shall clearly list such omitted work with proper credit given for same.

1.7 COOPERATION BETWEEN TRADES

- A. The Contractor shall give full information to the General Contractor and other Contractors, sufficiently in advance of this work, so that all necessary work by the other trades may be planned and installed without any delays. The Contractor shall furnish and locate all sleeves, supports, anchors, etc., so that the General Contractor may install the same in place. The Contractor shall locate all necessary work in advance without delay to the other trades. The Contractor shall advise the General Contractor of required partition thickness and furring to conceal cast iron hubs.
- B. In case of failure to give proper information as noted above, the Contractor will be required to do his own cutting and patching, or have same done by the General Contractor, but in no case shall there be any additional expense to the Owners.
- C. If Contractor installs his work before coordinating with other trades, or so as to cause any interference with work of other trades, he shall make the necessary changes in his work to correct the conditions without extra charge.

1.8 PROTECTION

- A. Contract Materials: The Contractor shall protect all materials and fittings, furnish board enclosures for all water closets, urinals, and lavatories, and protect all enameled surfaces with pasted on paper. No fixtures shall be used prior to acceptance.
- B. Material of Other Trades: The Contractor shall see that care is exercised to prevent injury, discoloration, or defacement of all finished building surfaces. The Plumbers shall do no cutting or fitting of any material other than his own. He shall exercise proper supervision to prevent floods, plumbing torches, and portable fires in the building. Any damage resulting therefrom shall be adjusted under this section to the full satisfaction of the Owner at no additional cost or increase in Contract time.
- C. Pipes: All open ends of pipe shall be properly capped or plugged during the construction period to prevent entrance of foreign materials and damage. No piping shall be installed outside of a building or in an exterior wall unless adequate provision is made to protect such pipe from freezing.
- D. No structural members shall be cut without acceptance of the Engineer.

1.9 TEMPORARY WATER

The General Contractor is to provide his own source of water, including storage, in preliminary stages of construction.

1.10 GUARANTEE

- A. The Contractor shall and hereby does guarantee that all work executed under this section will be free from defects of materials and workmanship for a period of one (1) year from the date of the final certificate and agrees to repair, free of expense to Owner, any defects that may occur within that time.
- B. The Contractor shall further warrant that all materials furnished and work executed is in accordance with all applicable laws, regulations, etc.
- C. The Contractor will not be responsible for defects which are clearly the result of bad usage of the equipment by persons not under his control.

PART 2 - PRODUCTS

2.1 BASIC MATERIALS AND METHODS

Unless otherwise indicated, the materials to be furnished under this contract shall be standard products of manufacturers regularly engaged in the production of such equipment, and shall be the manufacturer's latest standard design that complies with the specification requirements.

2.2 CLEANOUT

- A. Cleanouts shall be installed for soil, waste, and roof drainage piping at base of all risers, at changes in direction, where shown on plans, and as otherwise required.
- B. Provide a PVC or ABS Body, an ABS taper thread plug, round scoriated nickel bronze adjustable cover with vandal proof screws, Zurn #CO-2450 Series or equivalent.
- C. Provide clamping collar or membrane flange when required.

2.3 HANGERS

Hangers shall be copper clad steel band for all piping. Wrap band snug around shield and insulation and bolt together at top of insulation. Adjustable ring or clevis type may be used. Maximum support spacing shall comply with Section 313.0, Hangers and Supports, State of Maine Plumbing Code. Provide wall brackets for hangers on piping running on sidewalls. Provide hangers sized for insulation and galvanized shields for piping up to and including 2". Over 2" see Insulation Section of this Specification. All hangers shall be primer coated and one finish coat after installation.

2.4 HANGER SHIELDS

Insulation protection shields shall be 180°, carbon steel, galvanized equivalent to Grinnell Fig. 167. For pipe sizes 1/2" to 2", they shall be 18 gauge and 12" long.

2.5 SLEEVES

- A. Sleeves of steel pipe shall be furnished for straight runs of piping through masonry walls, masonry or stud partitions and floors. When piping is not insulated, the sleeves shall be two sizes larger than pipe size. When piping is insulated, the sleeves shall be large enough to allow approximately 1/4" space all around, between sleeves and insulation passing through sleeve. The Contractor will grout sleeve in place. Openings between sleeves and pipes shall be caulked and sealed smoke, fire, and watertight. Sleeves thru floor slabs shall extend 1" above finished floor.
- B. All interior wall sleeves (floor and wall) penetrations that accommodate piping shall be sealed with a three-hour rated sealant. Sealant shall be 3M Fire Barrier 2001 RTV Silicone Foam. Apply as directed by manufacturer.

2.6 PLATES

Chrome-plated, one piece wall, floor and ceiling escutcheon plates shall be provided at all uncovered piping in finished rooms.

2.7 IDENTIFICATION

Tag all new valves with Seton #m4506, or equal, 1-1/2" square brass tags and #6 bead chains, stamped with the following identification: "CW", "HW", "RHW" "Air", "Gas", or "Fire". Tags shall be consecutively numbered. DO NOT DUPLICATE EXISTING VALVE IDENTIFICATION NUMBERS. Fixture stops, control valves or valves adjacent to equipment, the use of which is obvious are not to be tagged.

Identify all new domestic cold water, hot water, recirculating hot water, gas, and sprinkler piping with "Set Mark" full snap-around pipe markers by Seton Name Plate Corporation or approved equal by Brady Corp. Markers shall include both identification and direction flow. Markers shall be no less than 10 feet apart except in Mechanical Rooms/Areas, and at water entrance where they shall be not less than 20 feet apart. Identification shall read "Domestic Cold Water Supply", "Domestic Hot Water Supply", "Domestic Recirculating Water", "Air", "Gas", and "Sprinkler" as applicable. Domestic hot and cold water piping shall be labeled differently from heating hot water.

Contractor shall provide Valve Tag Schedule as part of closeout documents.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Branch lines from service or main lines shall be taken off the top of the main or bottom of main, using such cross-over fittings as may be required by structural or installation conditions. All service pipes fittings and valves shall be kept a sufficient distance from other work to permit not less than 1/2 inch from finished covering and such other work, and not less than 1/2 inch between finished coverings on different services.
- B. All changes in pipe size and direction of soil, waste and storm lines shall be made with Y's and cleanouts, reducing fittings, or recessed reducers. Y's and 45-degree fittings, or 45-degree combination fittings, shall be used wherever possible. Use long sweep bends at bottom of stacks.
- C. All off-sets shall be made at an angle of not more than 45 degrees. All horizontal runs of soil and waste piping shall have a pitch of 1/4 inch to the foot unless indicated.
- D. Where vertical stacks turn to run horizontally, long sweep 1/4 bends or combination Y and 1/8 bends shall be used. Sanitary T's may be used where horizontal branches connect to vertical stacks. Long sweep fittings shall be used wherever conditions permit. Short radius fittings may be installed where in conformity with the Plumbing Code. Furnish and install cleanouts at bottom of all soil and waste stacks, at every change in direction on soil and waste piping, and where indicated on the drawings.
- E. Buried pipe shall be firmly bedded on a compacted gravel bedding at the required line and grade so that the barrel of the pipe rests on its entire length on the bottom of the trench. The interior of the pipe shall be clean when it is lowered into the trench. In no case shall the spigot end in the pipes chipped to avoid the use of a bend. Backfill for all the pipes shall be placed and compacted in accordance with the best practice of the trade.
- F. All piping shall be supported from the building structure with pipe hangers. All piping over 2-1/2" size shall be supported from top chord of joists.
- G. Cleanouts shall be provided in soil and waste piping in locations such that all portions of the lines shall be readily accessible for cleaning or rodding out. The maximum horizontal distance between cleanouts in piping shall not exceed fifty (50) feet on 4 inch and larger piping, thirty-five (35) feet on 3 inch piping; cleanouts shall be of the same size as the pipe in each case with 4 inch as the maximum size. Traps not integral with fixtures and in accessible locations shall be provided with brass trap screw protected by the water seal, and will be regarded as a cleanout.
- H. Test tees with brass cleanout plugs shall be installed at the foot of all vertical soil and waste lines. Wherever cleanouts on vertical lines occur concealed behind finished walls, they shall be extended to back of finish wall and a stainless steel or brass wall plate shall be provided flush with finished wall.
- I. When cleanouts occur on lines under floor slabs, they shall be brought up to underside of finished floor and shall have a floor cleanout with a rim at finish floor level.

- J. Exposed waste piping, traps and supplies to any fixture shall be chromium plated pipe or tubing and fittings.
- K. Any fixture or drain not having an integral trap shall have a separate trap provided adjacent to it.
- L. Cleanouts shall be provided at the base of all vent stacks.

3.3 TESTS

- A. All water piping shall be tested to a pressure of 125 lbs. per square inch for at least 30 minutes. Pressure drop in this period shall not exceed two lbs.
- B. Before each test is made on domestic water piping, the Contractor shall flush clean the system ready for test. After final test, all mixing valves, flush valves, check valves, strainers, storage tanks, circulating pumps, etc., shall be opened and all foreign material flushed or wiped clean. The Contractor shall submit a statement in writing to the Owner that all flushing has been completed and that the fixtures are free from foreign material.
- C. All drainage systems shall be tested in accordance with any laws or ordinances that apply. Each entire drainage system shall be tested with water and proved tight before any of the work is covered up.
- D. The Owners and/or Engineer shall be advised 48 hours in advance of all tests and the Contractor shall submit a statement in writing to the Engineer that all tests have been completed in accordance with specification and codes, and shall include a written acceptance from the local Plumbing Inspector.
- E. Contractor shall provide report indicating hot water temperatures at all lavatories, sinks, showers, and mixing valve locations. The report shall be part of the closeout documents.

3.4 FINAL CLEANING

The Contractor, on completion of the work and building, is to clean all fixtures and his work, to the satisfaction of the Engineer, and instruct the proper person in the use and control of the entire plumbing system. The Contractor shall remove all oil and debris, clean and polish all fixtures and metal to be exposed, clean out and flush all piping systems, traps, and cleanouts.

3.5 FINAL ACCEPTANCE

Before final acceptance of the work under this section, all damaged or imperfect materials shall be refinished or replaced. All debris, scaffolding, and tools shall be removed and premises shall be "broom clean" to the satisfaction of the Engineer.

END OF SECTION 22 00 00

SECTION 22 07 00 PLUMBING INSULATION

PART 1 - GENERAL

1.1 SCOPE

- A. Insulate all new cold water, hot water, and recirculating hot water piping.
- B. Insulate all new roof drain piping above the slab.

1.2 GENERAL CONDITIONS

- A. Refer to General Provisions Section 22 00 00 for provisions affecting work in this section.
- B. Heating piping and ductwork insulation specified in Section 23 00 00.

PART 2 - PRODUCTS

2.1 PIPE INSULATION

- A. Piping insulation shall be glass fiber pipe insulation with a reinforced kraft-aluminum foil jacket. Equal to Certainteed™ 500° Snap* On Pipe Insulation. Pipe insulation shall have a minimum wall thickness of not less than 1.0" for hot water and hot water return pipe diameter of up to 1-1/4, 1-1/2" for hot water and hot water return pipe over 1-1/4" and 1/2" for all cold water and condensate drain piping.
- B. Fittings and joints shall be insulated and finished with a one-piece premolded high impact PVC fitting covers with fiberglass inserts and accessories, 25/50 rated, equal to Proto LoSmoke brand.
- C. Where PEX tubing is used, in accordance with Section 22 11 19 PEX Piping, use preinsulated piping, or Rubatex of thickness noted above for glass fiber insulation above.

PART 3 - EXECUTION

3.1 PREPARATION

- A. All pipe surfaces to be covered shall be thoroughly cleaned before applying any insulation.
- B. All testing of systems shall be completed before applying insulation.

3.2 INSULATION

- A. All laps, joints and seams must be sealed for a vapor barrier, using manufacturer's recommended adhesive.
- B. All insulation shall be applied in accordance with the manufacturer's recommendations and applied in a first class manner.

- C. All fittings and valve bodies (concealed and exposed) on all piping shall be insulated to equal thickness. (Concealed shall be finished same as exposed.)
- D. Insulate with same material as piping or apply fiberglass molded or segmental insulation to fittings equal in thickness to that of the insulation to be applied to adjoining pipe and securely fasten in place, using wire.

END OF SECTION 22 07 00

SECTION 22 11 00 - WATER SYSTEM

PART 1 - GENERAL

1.1 SCOPE

The work under this section shall include all labor and material to install a domestic water system as shown on the drawings or specified herein or both.

1.2 GENERAL CONDITIONS

Refer to General Provisions Section 22 00 00 for provisions affecting work in this section.

1.3 CROSS CONNECTIONS

- A. No piping shall be installed to permit any back siphonage or flow of any polluted liquid into water distribution system.
- B. Vacuum breakers, air gaps or funnel type drains shall be used as required by local and State Plumbing Codes. All piping to faucets with hose threaded outlets and all fixtures with their outlets below the overflow shall have vacuum breakers.

1.4 WORK INCLUDED

- A. The work shall include, but shall not be limited to the following:
 - 1. Fixtures connected (whether supplied or not).
 - 2. Hot and cold water systems.
 - 3. Piping, hangers, sleeves, fittings, valves, gauges, controls, etc., required to complete the system.
 - 4. Plumbing piping and accessories associated with combination (domestic hot water/heating) boilers.
 - 5. Building water mains, to 5'-0" outside walls.

1.5 WORK BY OTHERS

- A. The following work, which is incidental to the installation, will be executed by others under the direction of the Contractor:
 - 1. Execute all required masonry and carpentry work, cutting, patching, furring's, plastering, etc., except as herein noted.
 - 2. Execute all required excavation work, backfilling, grading, etc. for water.
 - 3. Finished painting of piping, supports except as herein noted.
 - 4. Access panels in ceilings and walls for access to valves.

PART 2 - PRODUCTS

2.1 BASIC MATERIALS AND METHODS

- A. Unless otherwise indicated, the materials to be furnished under this contract shall be standard products of manufacturers regularly engaged in the production of such equipment, and shall be the manufacturer's latest standard design that complies with the specification requirements.
- B. All copper tubing shall be cut through and the ends shall be reamed out to the full inside diameter of the pipe.

2.2 DOMESTIC HOT AND COLD WATER SYSTEM

- A. Copper tubing shall be Type "L" for above ground, ASTM B-88.
- B. Copper tubing shall be Type "K" for underground, ASTM B-88.
- C. Types "K" and "L" copper tubing shall have joints of either wrought-copper or case brass solder joint fittings.
- D. Copper tubing and fittings shall be equivalent to Mueller Brass Co. Streamline Products.
- E. PEX tubing may be used in accordance with Section 22 00 19, except where exposed.

2.3 SOLDER

Solder for all accessible joints shall be "Lead Free" made up of 95.5 percent tin, and 4 percent copper and .5% silver equal to Engelhard Silver Brite 100. Flux shall be non-corrosive. All joints shall be wiped clean of solder and flux. Piping underground or slab on grade shall have silver solder joints of at least 1000° degrees solder.

2.4 VALVES

- A. All valves shall be Nibco, Apollo, Hammond, Wolverine Brass, or equivalent. They shall be installed where indicated and otherwise required to provide for complete operation and drainage of the system. Ball valves shall be used for shut-offs and drains; globe valves shall be used for throttling and plug type for balancing. Solder or screw type may be used up to 2" size, screw type only for 2-1/2" size and over. All above ground valves shall be of one manufacture.
- B. Bronze Ball Valves: (Up to 3" size), chromium-plated ball, full port design, 600 psi, W.O.G. rated threaded ends. Federal Specification WWV-35B, Type II, Class A, Style 3, and MMS Sp-72.
- C. Bronze Globe Valves: Class 150, conforming to Federal Specification WW-V-51, Class B, Type I and MSS SP-80.

- D. Plug Valves: Lubricated Plug, Semi-steel construction, 175 psi. W.O.G., maximum temperature limitations are 200°F.

2.5 WATER HAMMER ELIMINATORS

Furnish and install water hammer eliminators for fixtures in accordance with PDI Standards.

2.6 EXPANSION JOINTS, LOOPS AND ANCHORS

Provide expansion joints and loops on hot water supply and circulating returns where required to control expansion. Provide rigid anchors where required. Anchors shall be bolted collars held by angular braces in direction of piping. Provide guides on each side of all expansion joints.

2.7 HOSE BIBBS

Provide in locations shown and scheduled on drawings.

2.8 THERMAL EXPANSION TANKS

Furnish and install where shown on drawings thermal expansion tanks. Units shall be rated for 150 psig working pressure, have 2.0 gallon capacity, steel shell, butyl diaphragm, and polypropylene liner. Equal to Amtrol #ST-5.

PART 3 - EXECUTION

3.1 BASIC WATER PIPING SYSTEM

- A. Furnish and install the complete domestic hot water and cold water systems essentially as indicated on the drawings connecting to all fixtures and equipment requiring these services.
- B. Piping shall be new, run parallel, and graded evenly to draining points.
- C. Provide 1/2-inch drain valves at each low point in each piping system so that all parts of each system can be drained.
- D. No plumbing fixtures, devices, or piping shall be installed which will provide a cross or inter-connection between a distributing supply for a drinking water system or domestic water system and a polluted supply or drainage system or plant water system.
- E. Changes in pipe sizes shall be made with reducing fittings.
- F. Piping shall run as high and as close as possible and parallel to the walls, or as shown.
- G. Escutcheons shall be used for all insulated pipes passing through walls and finished spaces.

- H. No water pipe shall be installed outside of the building or in an exterior wall unless adequate provision is made to protect such pipe from freezing.
- I. The Contractor under this section shall make all final water connections to all equipment requiring these services that are furnished under other sections of this specification or furnished by the Owner, all as shown on the drawings. Connections shall include shut-off valves, flow restrictors, vacuum breakers, unions, and such other trim as hereinafter specified.
- J. Exposed water piping in toilets shall be chromium plated I.P.S. copper or brass pipe or tubing and fittings. Valves on exposed water piping in toilets shall be chromium plated brass or bronze.
- K. Provide ball valve at base of all domestic water risers and stop and check valves on all supplies to thermostatic mixing and shower valves, and ball and check valves on all circulating hot water return branches to main.
- L. Provide shock absorbers, chains, anchors, guides and expansion loops or joints as indicated or otherwise required to control pipe movement and any water hammer noise.

3.2 DOMESTIC COLD WATER

- A. The building cold water system shall begin 8' outside the building wall.
- B. The cold water system includes furnishing cold water main with risers, drops and branches to all fixtures and equipment.
- C. Provide suitable means to protect all water piping from water hammer.

3.3 DOMESTIC HOT WATER SYSTEM

- A. The main hot water system shall include connecting hot water and cold water piping to hot water heaters as shown on plans, hot water supply mains with risers and branches to all fixtures and equipment.
- B. Hot water piping shall be kept at least 6 inches away from cold water lines.
- C. Provide suitable means for thermal expansion for all hot water piping, using swing joints, expansion loops and long offsets, as required.
- D. Vent all high points in the hot water system. All hot water piping shall be pitched up toward fixtures and risers for proper air relief. (Fixture supplies shall be considered vents.)
- E. Provide a suitable means to protect all water piping from water hammer.

3.4 WATER QUALITY AND SYSTEM STERILIZATION

- A. Flush the finished well and system piping prior to sterilization.

- B. Add sodium hypochlorite (Clorox) to the well at the rate of 4 oz. to every 10' of water depth. This mixture should stand in the well for a minimum of two hours.
- C. Each water outlet in the system should be opened and allowed to run until a chlorine residual is detected. Add additional sodium hypochlorite if necessary.
- D. The system shall be left for 24 hours filled with the chlorine solution. After this time the system shall be thoroughly flushed to remove all residual chlorine.
- E. A water sample shall be taken and tested by the Maine Department of Health and Engineering. Send test samples in the name of the Owner for full bacteriological, organic, chemical, and physical quality. Provide test results to the Owner for his records.

END OF SECTION 22 11 00

SECTION 22 11 19 - PEX PIPING

PART 1 – GENERAL

1.1 SUMMARY

- A. This specification covers Branch & Main, Parallel Water Distribution Systems (ManaBloc), Cross-linked Polyethylene tubing, and fittings using PEX Press, ProPEX, and PEX Crimp technology for hot and cold water distribution systems. The system is assembled when the fitting barb is inserted fully into the tubing and either a stainless press sleeve, ProPEX fittings, or copper crimp ring is pressed/crimped over the tubing and fitting using the appropriate tool to create a leak proof permanent joint.
- B. PEX is not to be used for water entrance or where exposed in mechanical spaces.

1.2 REFERENCES

- A. ASTM F876 specification for Cross-linked Polyethylene (PEX) tubing.
- B. ASTM F877 specification for Cross-linked Polyethylene (PEX) plastic hot and cold-water distribution systems.
- C. ASTM F2023 test method for evaluating the oxidative resistance of Cross-linked (PEX) tubing and systems to hot chlorinated water.
- D. ASTM F1807 specification for metal insert fittings utilizing a copper crimp ring for SDR9 Cross-linked Polyethylene (PEX) tubing.
- E. ASTM F2159 specification for plastic insert fittings utilizing a copper crimp ring for SDR9 Cross-linked Polyethylene (PEX) tubing.
- F. ASTM E84 surface burning characteristics of building materials.
- G. CSA CAN/CSA B137.5 Cross-linked Polyethylene (PEX) tubing systems for pressure applications.
- H. NSF 14 – plastic piping component and related materials.
- I. NSF 61 – drinking water system components – health effects.
- J. AWWA C651 standard for disinfecting water mains.
- K. IAPMO Uniform Plumbing Code.
- L. IAPMO Uniform Mechanical Code.
- M. ICC International Plumbing Code.
- N. ICC International Mechanical Code.

- O. NAPHCC National Standard Plumbing Code.
- P. cULus - UL 1821 listing for Multipurpose residential fire sprinkler systems (ViegaPEX Ultra Black and PEX Press fittings in ¾" - 2" sizes only).
- Q. ANSI/UL 263 Fire test of building construction and materials.
- R. CAN/ULC S101 Standard methods of fire endurance tests of building construction and materials.
- S. CAN/ULC S102.2 Standard method of testing for surface burning characteristics of flooring, floor covering and miscellaneous materials and assemblies.

1.3 QUALITY ASSURANCE

- A. The installer shall be a qualified installer, licensed within the jurisdiction, and familiar with the installation of Cross-linked Polyethylene (PEX) tubing systems.
- B. The installation of Cross-linked Polyethylene (PEX) tubing for hot and cold-water distribution systems shall conform to the requirements of the ICC International Plumbing Code or IAPMO Uniform Plumbing Code.

1.4 DELIVERY, STORAGE AND HANDLING

- A. The Cross-linked Polyethylene (PEX) tubing shall be shipped to the job site on truck or in such a manner to protect the tubing. The Cross-linked Polyethylene fittings and manifolds shall not be handled rough during shipment. The tubing and fittings shall be unloaded with reasonable care.
- B. Cross-linked Polyethylene plastic tubing and fittings shall be stored in a flat, dry, well-ventilated location, not exposed to direct sunlight. Normal care in handling shall be exercised to avoid abuse of the tubing. The tubing and fittings shall not be thrown or dropped on the ground, walked on, or dragged.

1.5 PROJECT CONDITIONS

- A. The location of a manifold with valves shall be accessible and in an area not subject to freezing. Proper support of the manifold shall be provided.
- B. PEX tubing should not be left exposed in direct sunlight for extended periods of time – short periods not to exceed 60 days are permissible.
- C. Plastic manifolds and fittings should not be left exposed in direct sunlight for extended periods of time — short periods not to exceed 15 days are permissible.

1.6 WARRANTY

- A. The tubing and fittings manufacturer shall warrant that the tubing and fittings are free from defects and conform to the designated standard. The warranty shall only be applicable to tubing and fittings installed in accordance with the manufacturer's installation instructions.
- B. The manufacturer of the tubing and fittings shall not be responsible for improper use, handling, or installation of the products.

PART 2 – PRODUCTS

2.1 MATERIAL

- A. Tubing Standard: PEX High-Density Cross-linked polyethylene tubing shall be manufactured to the requirements of ASTM F876 and meet the standard grade hydrostatic pressure ratings from Plastic Pipe Institute in accordance with TR-4/03. The following three standard grade ratings are required.
 - 200 degrees F (93 degrees C) at 80 psig (551 kPa)
 - 180 degrees F (82 degrees C) at 100 psig (689 kPa)
 - 73.4 degrees F (23 degrees C) at 160 psig (1102 kPa)
 1. Chlorine testing: According to ASTM F876 shall meet or exceed the following end use condition.
 - End use conditions of: 100% @ 140°F
 - Per PEX 5306 (CL5)
 2. UV testing: According to ASTM F876 PEX tubing products shall meet or exceed the following exposure limits.
 - PEX 6 months
 - PEX Ultra 6 months
- B. Fitting Standard: PEX Press fittings shall be manufactured from UNS, C87700, C87710 Bronze, or Radel R® polymer, meeting the requirements of ASTM F877 tested as a system with PEX tubing. The PEX Press sleeve shall be manufactured out of a 304 grade or better stainless steel and have one view hole (loose sleeve) or three view holes (attached sleeve) to ensure proper PEX tubing insertion. The attached sleeve fitting will incorporate a tool locator ring that shall be in place while making a proper press connection. The PEX Press connection shall be made with a Manufacturer supplied ratcheting PEX Press hand tool or PEX Press power tool.
- C. Fitting Standard: PEX Crimp fittings for use with copper crimp rings shall be manufactured from UNS C69300 or C87850 Brass / Eco Brass® meeting the requirements of ASTM F1807 and or PolyAlloy polymer meeting the requirements of ASTM F2159. The PEX Crimp connection shall be made by use of a full circle crimp tool designed to crimp F1807 copper crimp rings.
- D. Fitting Standard: ProPEX fittings shall meet the requirements of ASTM F 1960, Cold Expansion Fittings with PEX reinforcing rings.

- E. Manifolds: Acceptable manifolds shall include:
- Copper Manifolds: Shall be copper material having a male or female solder, ProPress or PEX Crimp inlets. All outlets shall be equal to PEX Press, PEX Crimp, ProPEX, or ProPress fittings. Shall be provided by the Cross- linked Polyethylene system manufacturer.
 - Polymer Manifolds: Shall be plastic material having a male NPSM thread, equal to PEX Press ProPEX, or PEX Crimp inlets. All outlets shall be PEX Press, ProPEX, PEX Crimp, or PEX compression connections provided by the PEX system manufacturer.
- F. Adapter Fittings: PEX adapter fittings shall conform to one of the following ASTM standards; F877, F1807, F2159, or ASME B1.20.1 and be listed to the CSA B137.5. The adapter fittings shall mate to NPT threads, copper tubing, copper fittings, ProPress fittings, ProPEX, or approved equal.

2.2 SOURCE QUALITY CONTROL

- A. The PEX tubing and fitting manufacturer shall maintain a third party listing of the tubing and fittings. The tubing and fittings shall be certified in accordance with ANSI/NSF 14/61 to verify suitability to transport potable water. The tubing and fittings shall have the mark “NSF-pw”, “cNSF[®] us pw-G”, or “NSF 61” permanently marked on the product to verify the material listing.
- B. The manufacturer of the PEX tubing and fittings shall maintain a quality control program in accordance with ISO 9001 or NSF International in the manufacturing plant to assure that the tubing and fittings are continually being produced to the required standard. The tubing and fittings shall be certified as complying with NSF 14.

PART 3 – EXECUTION

3.1 EXAMINATION

The installing contractor shall carefully examine the PEX tubing for defects, cuts, abrasions, cracks, fading color, or blemishes. There shall be no cracks or heavy deformations of the tubing. Fittings and manifolds shall be checked for any signs of abuse. Any damaged tubing or fittings shall be rejected.

3.2 PREPARATION

- A. PEX Tubing: Cross-linked Polyethylene tubing shall be cut with a PEX tubing cutter. The tubing shall be cut squarely and neatly to permit a proper connection between the tubing and fitting.
- B. FostaPEX Tubing: Cross-linked Polyethylene tubing shall be cut with a PEX cutter. The tubing shall be cut squarely and neatly to permit a proper connection between the tubing and fitting. The outer polyethylene and aluminum layers shall be removed with a Viega supplied prep tool leaving the inner PEX tubing to accept the PEX Press fitting and stainless press sleeve. The prep tool shall have an internal stop to ensure proper length of exposed inner PEX tubing.

3.3 INSTALLATION GENERAL LOCATIONS

Plans indicate general location and arrangement of PEX system. Identified locations and arrangements are used to size pipe and calculate friction and loss and other design considerations. Install PEX tubing as indicated, except where deviations to layout are approved on coordination drawings.

3.4 INSTALLATION, PEX TUBING

- A. Pressure Rating: Install components having a pressure rating equal to or greater than the system operating pressure.
- B. Install PEX tubing that is free of blemishes, cuts, gouges, kinks or noticeable fading of color.
- C. Changes in Direction: PEX tubing shall not exceed an eight times the tubing outside diameter (OD) free bend radius or a five times the tubing OD supported bend radius, with use of a Manufacturer approved bend support. Install fittings for changes in direction where any minimum bend radius is exceeded and branch connections.
- D. PEX Press Connections: Bronze PEX Press fittings shall be made in accordance with the manufacturer's installation instructions. The Stainless press sleeve shall be placed over the end of the squared off PEX tubing while fully inserting the fitting barb into the tubing. Full tubing insertion shall be verified by a visual confirmation of PEX being present through the view holes before engaging a press connection. Full insertion for an attached sleeve connection means tubing must be completely visible in at least two view holes and partially visible in the final view hole. Full insertion for a loose sleeve connection means tubing must be completely visible in the single view hole. The PEX Press connection shall be made with a Manufacturer supplied ratcheting PEX Press hand tool or PEX Press power tool.
- E. PEX Crimp Connections: PEX Crimp fittings shall be made in accordance with the manufacturer's installation instructions. The copper crimp ring shall be placed over the end of the squared off PEX tubing then the PEX Crimp fitting fully inserted into the tubing. Position the crimp ring $\frac{1}{8}$ " to $\frac{1}{4}$ " from the end of the tubing before engaging a crimp connection. The PEX Crimp connection shall be made with a Manufacturer supplied full circle crimp tool or equivalent.
- F. ProPEX Connections: ProPEX fittings shall be made in accordance with the manufacturer's installation instructions. The ProPEX ring shall be placed over the end of the squared off PEX tubing, then the ProPEX fitting is fully inserted into the tubing. ProPEX expansion tools are utilized to expand tubing temporarily before fittings are inserted into tubing.
- G. Threaded Joints: Threaded joints shall have a potable water listed joint sealant tape applied to the male threads only. Tighten joint with a wrench and backup wrench as required.
- H. PEX Tubing Protection: Protect PEX tubing from exposure to direct and indirect sunlight exposure. PEX tubing shall be stored under cover, shielded from direct and indirect sunlight when material is stored for any length of time.

- I. Penetration Protection: Provide allowance for thermal expansion and contraction of PEX tubing passing through a wall, floor, ceiling, or partition by wrapping with pipe insulation, or by installing through an appropriately sized sleeve. Penetrations of fire resistance rated assemblies shall maintain the rating of the assembly.
- J. Backfill Material: Back fill material must be free of large rocks, glass, or other sharp objects that can damage the PEX tubing.
- K. Horizontal Support: PEX tubing must be supported every 32" horizontally with Manufacturer approved suspension clips or plastic insulators.
- L. Vertical Support: PEX tubing must be supported at each floor or ceiling penetration and every four feet in between.

3.5 FIELD QUALITY CONTROL

- A. Water Testing: The PEX tubing system shall be pressure tested in accordance with local code after installation or to at least minimum system working pressure, no less than 40 psi, and for a period of no less than 15 minutes. Water used for this testing shall come from a potable water source. Test should not exceed pressure rating of PEX tubing and shall have no leaks.
- B. Air Testing: In lieu of a water test, the PEX tubing system shall be air tested in accordance with local code after installation, or at least system working pressure, no less than 40 psi and no greater than 100 psi. The test shall be conducted for a period of no less than 15 minutes and no greater than an hour and not leak more than 8 psi over the test duration.

3.6 CLEANING

- A. Disinfection: The PEX hot and cold-water distribution system may require system disinfection. When no other method is available, follow the time limitations and exposure levels listed below.
 - 1. Flush the system with potable water until discolored water does not appear at any of the outlets.
 - 2. Fill the system with a water chlorine solution containing at least 50 parts per million of chlorine. The system shall be valved in the closed position and to stand for 24 hours. Alternatively, the system shall be filled with water chlorine solution containing at least 200 parts per million of chlorine. The System shall be valved in the closed position and allowed to stand for 3 hours.
 - 3. Following the standing time, the system shall be flushed with water until the chlorine is purged from the system.

END OF SECTION 22 11 19

SECTION 22 40 00 -PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SCOPE

The work under this section shall include all labor and material to install all fixtures as shown on the drawings or specified herein or both.

1.2 GENERAL CONDITIONS

Refer to General Provisions Section 22 00 00 for provisions affecting work in this section.

1.3 PROTECTION

The Plumbing Contractor shall protect all fixtures from damage during construction, furnish board enclosures for all water closets, urinals, lavatories and sinks and protect all enameled surfaces with pasted on paper. No fixtures shall be used prior to acceptance.

PART 2 - PRODUCTS

2.1 MATERIALS

Fittings and Trim shall be chrome-plated brass and unless otherwise specified and shall be of same manufacture as fixtures, including traps, flow restrictors, supplies, stops, and union connections. Any chrome trim with wrench marks shall be removed and new trim installed.

2.2 FIXTURES

- A. All fixtures shall be free from all imperfections, smooth watertight and complete in every respect.
- B. Where specified, fixtures of American-Standard Manufacturer of description and quality listed, or equivalent, shall be furnished and installed complete with all wall hangers, stops, fittings and connections. See Fixture Schedule on Plans.

2.3 FIXTURE SUPPORTS

- A. Provide acceptable foot supported carriers for all wall-hung fixtures except where noted on plans. Carriers shall be as noted on the drawings.
- B. No fixture shall be supported off the wall except where noted on plans.

PART 3 - EXECUTION

3.1 CONDITION OF SURFACES

Inspection of Roughing-In: Inspect roughing-in to see that it is in the exact position to allow fixtures to be at locations and heights indicated. Do not proceed until all positions are verified or any adjustment in fixture location is accepted by Architect/Engineer.

3.2 INSTALLATION

- A. Traps: Provide traps for all fixtures and equipment whether supplied or not, chrome-plated brass non-siphon traps shall be provided where required by the law in lieu of traps.
- B. Fixture Hangers and Stops: All fixtures supplied under this contract shall have key stops on supplies and mounting hangers or brackets for wall hung types. Also, provide key stops on supplies to all fixtures not supplied but connected under this contract.
- C. Fixture Mounting Heights: Verify all mounting heights with the Engineer.

3.3 CLEANING

Clean fixtures and trim just prior to final inspection. Clean out all strainers and aerators and adjust or replace washers to prevent leaks at faucets and stops

END OF SECTION 22 44 00

SECTION 23 00 00 - HEATING, VENTILATION, AND AIR CONDITIONING

PART 1 - GENERAL

1.1 GENERAL CONDITIONS OF THE CONTRACT

All of the provisions of the General Conditions, Information for Bidders, Special Provisions of the General Contract are a part of this section. The Contractor should be familiar with these sections of the project.

1.2 SCOPE OF WORK

The Contractor shall furnish all labor and materials to complete all heating and ventilating work as shown on the drawings or herein specified, or both. The drawings do not show all the details for the pipes, valves, fittings, hangers, ductwork, and equipment to be used for complete installation, but show general arrangement and extent of the work to be performed. Included in this Contractor's work (but not limited to) are:

- A. Boiler and accessories.
- B. Grilles, Registers and Ductwork.
- C. Room Heating Units.
- D. Make-up Air Units.
- E. Piping and supports.
- F. Valves, Fittings, and related items.
- G. Insulation of piping and ductwork.
- H. Fuel Supply System.
- I. Hot Water Specialties: i.e., air vents, and drains, etc.
- J. Room Automatic Temperature Control System and all low voltage control wiring.
- K. Energy Recovery Ventilators.
- L. Cut all holes for piping in walls, floors, and ceilings.

1.3 RECORD DRAWINGS

- A. This Contractor shall maintain at site two separate sets of black line prints of the Mechanical Drawings. As the work progresses, he shall mark neatly and accurately all changes from the

original layouts and the work accomplished day by day. Colors shall be used in marking the various services.

- B. These sets of prints will be inspected and considered a guide to determining the amount of work installed. If these drawings are found inaccurate or incomplete, they shall be corrected promptly. This procedure is mandatory, and the Engineer will not review requisitions for payment until satisfied that this has been complied with and is up-to-date.
- C. These "As Built" drawings shall be turned over to the Engineer upon completion of the project for preparation of reproducibles by the Engineer for the Owners.
- D. Final payment will not be made until these "As Built" drawings have been received and accepted.

1.4 SPECIAL CONDITIONS

- A. All materials shall be new and of the latest design of the respective manufacturers. All materials and equipment of the same classification shall be of the same manufacture unless otherwise specified.
- B. Codes constitute minimum requirements. If a higher standard is specified, the higher standard shall supersede the code requirements. Any conflicts shall be resolved to the satisfaction of the Engineer before proceeding with construction. The latest edition of the Standards for the Installation of Oil Burning Equipment, State of Maine Department of Insurance and all other applicable codes shall be the standard for this project. Interpretations of these codes must be acceptable to the Engineer.
- C. Specification by brand name, manufacturer, or type is to establish standards of quality and style. Under the contract these materials shall be furnished as specified unless a change has been approved by the Project Engineer. Where two or more designations are listed, the Contractor may select at his option.
- D. Drawings shall be considered as though part of the specifications. All information contained on the drawings supplied by the Engineer shall be as though it were written in these specifications, subject to the following:
 - 1. Drawings are not to be scaled for dimensions.
 - 2. Layouts are not absolute. It is subject to minor changes to facilitate installation.
 - 3. Locations are not exact but are as close as clear drafting practice will allow. Field verification with the Engineer or his designated representative shall be the responsibility of this Contractor.
 - 4. This Contractor shall keep fully informed on the space and position requirements of his work and shall give information to the Contractor to allow coordination with other trades. Particular attention shall be paid to proper clearance from other pipes, electrical conduit, etc., as well as any other structural components.
 - 5. A set of AS-BUILT DRAWINGS, clean and clearly marked in red, shall be kept on the job at all times and turned over to the Engineer upon completion of the project.

1.5 SUBSTITUTIONS

- A. Any proposal for substitution shall be made in writing by the Contractor who shall submit full details for consideration and obtain written approval of the Engineer. The Engineer's decision as to acceptability of the substitute material or equipment shall be final. Approval by the Engineer for such substitutions shall not relieve the Contractor from responsibility regarding a satisfactory installation of such work in accordance with the intent of the plans and specifications and shall not affect his guarantee covering all parts of the work.
- B. Any additional cost resulting from the substitution of equipment shall be paid by this Contractor.

1.6 EXISTING CONDITIONS

This Contractor shall visit the site and be familiar with all existing conditions prior to submitting a bid. The Contractor shall also check the Engineer's building plan for elevations, locations of concealed piping and ductwork, location of grilles and registers. Failure to do so does not relieve the Contractor of his responsibility regarding satisfactory installation of the system.

1.7 CO-ORDINATION WITH OTHER TRADES

This Contractor shall be responsible for the co-ordination of his work with the electrical and plumbing contractors and shall make the necessary adjustments and changes to facilitate installation of all ducts, conduits, and piping in the spaces available.

1.8 PROTECTION OF WORK

This Contractor shall assume full responsibility for the care and protection of all materials and mechanical work until the project is accepted by the Owner. Any material damaged or destroyed shall be immediately removed from the premises and replaced with equipment in full compliance with the specification without expense to the Owner.

1.9 OBJECTIONABLE NOISE AND VIBRATION

Mechanical equipment shall operate without objectionable noise and vibration. Should objectionable noise or vibration be transmitted to any occupied part of the building by apparatus, piping, or ducts, as determined by the Engineer, the necessary changes eliminating the noise or vibration shall be made by the Contractor at no extra cost to the Owner.

1.10 ORDINANCES, PERMITS AND FEES

The Contractor shall obtain all licenses or permits, pay all fees, and comply with all local and state rules and regulations as well as those of the National Board of Fire Underwriters.

1.11 INSURANCE: See General Conditions and Special Provisions of the General Contract.

1.12 STATEMENT OF INTENT

It is the intent of the drawings and specifications to provide for the installation of an H.V.A.C. system that is safe, quiet, and economical in operation and complete in all respects.

1.13 ALTERNATES

Several alternate prices are required in these bidding documents. The Contractor is responsible for separating the work called for in the various alternates and be prepared to undertake any part or all of the work called for in the alternate(s) which are accepted by the Owners.

Alternate 2:

1. For the two bedroom apartments, relocate all equipment in the second floor mechanical room to first floor Entry Closet 2. This includes Boiler B-1, Circulator CP-1, Buffer Tank BT-1, Make-up Air Unit MAU-1 and Energy Recovery Ventilator ERV-1. Coordinate with other trades for relocation of associated electrical power and control circuits; plumbing connections; and ductwork.

Alternate 3:

1. For all apartments, delete the following systems, complete with power and control wiring, and ductwork.
 - a. Make-up Air Unit (MAU-1).
 - b. Energy Recovery Ventilator (ERV-1).
2. Revise toilet room exhaust fan control, as described in the Sequence of Operation in this section.

PART 2 - PRODUCTS AND MATERIALS

2.1 PIPING

A. Hot Water

1. Schedule 40, standard weight black steel ASTM 120 or Type L hard drawn copper tubing, above grade, and Type K copper below grade.
2. Except in exposed areas of mechanical spaces, oxygen barrier PEX, equal to Uponor hePEX may be used. Provide pre-insulated hePEX piping below grade.

B. Cold Water - Type- L hard drawn copper tubing.

C. Condensate Drain Piping Schedule_40 PVC plastic pipe and fittings with solvent-welded joints.

D. Drains and Vents - Type-L hard drawn copper tubing.

- E. Pipe Sleeves - Schedule 40 black iron through masonry. 18 Gage galvanized steel or heavier in stud wall construction.

2.2 VALVES AND RELATED MATERIALS

A. Fittings:

1. Screwed - 125# cast iron screwed pattern ASTM A126, ASA B16.1
2. Unions - 250# malleable iron with brass to iron ground seats.
3. Flanges - 150# forged steel slip-on ASTM A234.
4. Sweat - Cast bronze or wrought copper.
5. Connections to equipment - Screwed unions.

B. Acceptable Manufacturers - Valves:

1. Nibco
2. Apollo
3. Jenkins
4. Stockham
5. Hammond
6. Armstrong
7. Watts.

C. Valve Connections:

1. Provide valves suitable to connect to adjoining piping as specified for pipe joints. Use pipe size valves.
2. Thread pipe sizes 2 inches and smaller.
3. Flange pipe sizes 2-1/2 inches and larger.
4. Solder or screw to solder adaptors for copper tubing.

D. Valves:

1. OS and Y Gate Valves: Flanged, iron body, 125-lb. S.W.P., 200 lb. W.O.G., solid wedge. Federal Specification WW-V-58 Class I, Type I and MSS SP-70.
2. N.R.S. Gate Valves: Flanged, iron body, 125-lb. S.W.P., 200 lb. W.O.G., solid wedge, bronze-mounted. Federal Specification WW-V-58, Class I, Type I and MSS SP-70.
3. Bronze Gate Valves (Rising Stem): Solid wedge, 125 lb. S.W.P., 200 lb. W.O.G. Federal Specification WW-V-54, Class Q, Type II and MSS SP-80.
4. Butterfly Valves: Lug-type body (2" through 24" sizes). Seat material shall be E.P.T. or Buna-N. Pressure rating shall be 150 psi at 225°F.
5. Plug Valves: Lubricated plug, semi-steel construction, 175 psi, W.O.G., maximum temperature limitations are 200°F.
6. Bronze Globe Valves: Class 150, conforming to Federal Specification WW-V-51, Class B, Type I and MSS SP-80.
7. Bronze Ball Valves: (Up to 3" size), chromium-plated ball, full-port design, 600 psi, W.O.G. rated threaded ends. Federal Specification WWV-35B, Type II, Class A, Style 3, and MSS SP-72.
8. Silent Check Valves: Globe-style bronze check valve (sizes 2" through 30"), 150 psig rated.

- E. Balancing Fittings - Balance fittings shall have 125# bronze bodies equal to Sarco Balance Master, unless otherwise noted on drawings.

2.3 BALANCING VALVES

A. Bronze Calibrated-Orifice, Balancing Valves:

1. Basis-of-Design Product: Taco: Accu-Flo.
2. Body: Bronze, ball or plug type with calibrated orifice.
3. Ball: Brass or stainless steel.
4. Plug: Resin.
5. Seat: PTFE.
6. End Connections: Threaded.
7. Pressure Gage Connections: Integral seals for portable differential pressure meter.
8. Handle Style: Lever, with memory stop to retain set position.
9. CWP Rating: Minimum 125 psig.
10. Maximum Operating Temperature: 250°F.

2.4 WATER PRESSURE REDUCING VALVES

Equal to Bell and Gossett No. 12.

2.5 AIR VENTS

Automatic air vents shall be Armstrong air vent traps No. 1 - AV 1/2" with stainless steel trim or approved equal. Manual air vents shall consist of an air chamber with 3/8" pipe off the top and 3/8" gate valve.

2.6 BOILER BURNER UNIT – HIGH EFFICIENCY (LP GAS FIRED)

- A. This Contractor shall furnish and install as indicated on the plans an LP Gas fired, high efficiency, sealed combustion, direct vent, wall hung combination boiler.
- B. Boiler shall be constructed with cast aluminum heat exchanger, integrated controls, sealed combustion chamber, vent and combustion air connectors, silencer for quiet operation.
- C. Boiler shall be equipped with a pre-piped boiler manifold consisting of circulator pump, isolation ball valves, balance valve, purge station, pressure and temperature gauge, relief valve, heating loop connections, and domestic hot water loop connections.
- D. Boiler shall be equipped with an integrated control panel that includes diagnostic display, status indicator lights, heating and DHW dials, and programming and diagnostic access buttons.
- E. Vent piping system shall be 3" PVC or CPVC in compliance with ANSI, ASTM D1785 (Schedule 40). Cement and primer must comply with ASTM D2564. Provide concentric vent kit and all required accessories for through roof or wall terminations, as shown on the drawings.

2.7 CIRCULATORS

Heating system circulator pumps to be as scheduled on the drawings.

2.8 EXPANSION TANKS AND FITTINGS

Furnish and install expansion tanks where shown on plans. Tank shall be designed for 100 psi min. working pressure, have a steel shell butyl diaphragm and polypropylene liner.

2.9 AUTOMATIC TEMPERATURE CONTROL - GENERAL

- A. The Contractor shall provide and install a complete system of automatic temperature control for the Heating/Ventilation System including all required control wiring, gauges, thermostats, thermometers, dampers, damper operators, control valves and relays.
- B. Controls shall be of electronic type as manufactured, installed and serviced by Honeywell or approved equal.
- C. All controls shall be fail safe with spring return motors, etc., as indicated and required.
- D. The Contractor shall provide and install control panel(s) with switches and adjusters mounted inside. Panel door shall have a key lock. All solid-state components except sensors shall be mounted inside the panel and be prewired to terminal strips.
- E. All automatic control dampers shall be furnished by the Temperature Control Contractor and shall be installed by the Heating Contractor under the Control Contractor's supervision. Dampers shall be low leakage type with blade and jamb seals. Damper operator shall be of the spring return type and shall be of sufficient size to operate the damper.
- F. The entire installation shall be complete in every respect and guaranteed by the Control Contractor against original defects in workmanship or materials for a period of one (1) year from date of final completion. The Contractor shall maintain the equipment in perfect working order for the guarantee period without additional charge.
- G. The control system shall have the necessary equipment to perform the functions described and scheduled on the drawings.
- H. All automatic control valves shall be furnished by the Temperature Control Contractor and shall be installed by the Heating Contractor under the Control Contractor's supervision.
- I. Name Tags - Phenolic engraved nameplates shall be attached to all components to indicate their functions.

2.10 AUTOMATIC TEMPERATURE CONTROL - SEQUENCE OF OPERATION

A. Boiler B-1:

- 1. Whenever the outdoor temperature sensor (mount on north side of building) is below the warm weather shut down setting, the heating system will be operational.

2. Primary circulator CP-1, shall operate continuously when boiler system is operational. CP-1 shall modulate its speed to maintain adequate system pressure via its integral controls.
3. Maintain setpoint at the buffer tank (BT-1) outlet sensor, by energizing the boiler's integral pump, and modulating the boiler output. Reset the water temperature at BT-1 outlet according to outdoor conditions.
4. On a call for domestic hot water energize the boiler system and maintain 140°F to the domestic hot water mixing valve.

B. Panel Radiators:

1. Control panel radiators via thermostatic radiator valves.

C. Kick Space Heater:

1. Control kick space heater fan via line volage thermostat.

D. Energy Recovery Ventilator:

1. ERV-1 shall run continuously at low speed. Manually switch to high speed via boost switch in living area.

E. Make-Up Air Unit:

1. Operate the make up air unit (MAU-1) fan whenever current sensors in kitchen hood, clothes dryer, or bathroom exhaust fan circuits are energized. Vary MAU-1 speed based on requirements of energized devices. Vary speed of MAU-1 based on energized exhaust equipment.
2. Modulate MAU-1 electric coil to maintain discharge air setpoint of 70°F (adj.).

F. Exhaust Fans:

1. Base Bid:
 - a. Energize fan via motion and condensation sensors.
2. Alternate 3:
 - a. Fan to run at low speed continuously.
 - b. Increase fan speed via motion and condensation sensors.

2.11 PIPE INSULATION

- A. Piping insulation shall be glass fiber pipe insulation with a reinforced kraft-aluminum foil jacket. Equal to Certainteed™ 500° Snap* On Pipe Insulation. Pipe insulation shall have a minimum wall thickness of not less than the diameter of the pipe for a pipe up to 2" in diameter. Insulation wall thickness shall not be less than 2" for pipes 2" or greater in diameter.
- B. Fittings and joints shall be insulated and finished with one-piece pre-molded high impact PVC fitting covers with fiberglass inserts and accessories, 25/50 rated, equal to Proto LoSmoke brand.

2.12 VENTILATION FANS

Furnish and install ventilation exhaust fans sized and located as called for in the schedules on the drawings.

2.13 VENTILATION DUCTWORK

Ductwork shall be of galvanized sheet metal and shall be new copper-bearing sheets of lock-forming quality. Zinc coating that will flake or peel under any forming operation, or laminated sheets will not be allowed. Thickness of metal for rectangular ducts, including elbows and other details, shall be as follows:

Longest Rectangular Dimension of Duct Inches	Thickness Galv. Steel USS Gauge
Up thru 12	26
13 thru 30	24
31 thru 54	22
55 thru 84	20

Ductwork shall be reinforced in accordance with the latest SMACNA Duct Construction Standards – Metal and Flexible. All dampers and deflectors shall be #22 gauge and stiffened as required.

2.14 DUCT INSULATION

- A. Flexible Blanket: Ductwork required to be insulated shall be insulated with 1 1/2" thickness 1 lb. density flexible Glass fiber duct insulation with Foil-Skrim-Kraft facing. Insulation equal to Owens Corning Fiberglass All-Service Duct Wrap.
- B. Adhesive shall conform to Adhesive and Sealant Council Standards for Adhesives for Duct Liner; ASC-A-7001 A-1971.
- C. Mechanical fasteners shall conform to "HVAC Duct Construction Standards", available from Sheet Metal and Air-Conditioning Contractors National Association, latest edition.

2.15 HEATING TERMINAL UNITS

Heating units (kick space heaters and panel radiators) shall be as scheduled on the Drawings.

2.16 ENERGY RECOVERY VENTILATOR (ERV)

Provide energy recovery ventilators as scheduled on the drawings. Coordinate ventilation boost control location with Architect.

2.17 DAMPER

ERV intake air and exhaust air backdraft dampers, as indicated on plans, to be American Aldes Model BDD, Fantech Model RSK, or equivalent, sized for duct.

PART 3 - EXECUTION

3.1 PIPING - GENERAL

- A. Provide and install the hot water supply and return piping shown on the plans and as required to complete the intended installation. The Contractor shall make such off-sets as are shown or required to place all piping in proper position to avoid other work (especially other piping and electrical).
- B. The size and general arrangements, as well as the methods of connecting all piping, valves, equipment, etc., shall be as indicated, or as approved by the Engineer.
- C. All piping shall be erected to provide for the easy and noiseless passage of water under all working conditions. Inverted eccentric reducing fittings shall be used wherever hot water pipes reduce in size. Provide 1/2" ball valves with hose couplings for drains at all low points in the piping system.
- D. All water mains shall be run level or pitch slightly upward so that no air pockets are formed in the piping. The mains shall be set at elevations such that the runouts feeding heating equipment shall have no pockets where air can collect or where vents are provided.
- E. In the erection of water piping care must be taken to make proper allowances for expansion and contraction; piping shall be anchored as necessary to control the expansion. Runouts to radiation shall be the size indicated on the plans and shall come off the top of the mains at a 45° angle for upfeed radiators and downward at a 45° angle for downfeed radiators.
- F. Install a sufficient number of flanged fittings and/or unions to facilitate assembly and disassembly of piping and removal of equipment. Install ball valves on each side of unit heaters, cabinet heaters and circulation pumps.
- G. All water mains 3" and larger shall have welded connections using standard factory-fabricated tees, elbows, reducers, caps, etc. Branch outlets in welded sizes shall be made with tees for full size or one size reduction and with either "weldolets" or factory shaped nipples for all other sizes. All welds shall be made by qualified welders capable of welding in any position "in the field". All welds shall conform with the rules set forth in the Standard Manual of Pipe Welding of the Heating, Piping and Air-Conditioning Contractors National Association.
- H. Water piping 2½" and smaller shall have screwed connections in the case of black iron pipe and sweat fittings in the case of hard drawn copper. Copper fittings shall be joined with 50/50 solder above grade and silver solder below grade.
- I. Pipe Hangers: Shall be provided at maximum intervals of ten feet, for horizontal pipes. Hangers shall be as shown on plans or equivalent, with Engineer's approval. Vertical pipes shall be supported by adjustable malleable iron brackets.

- J. Pipe Sleeves: Furnish and install pipe sleeves for heating pipes passing through walls and ceilings. All pipe sleeves shall be sized to permit continuous pipe insulation to pass through.
- K. Escutcheons: Furnish and install chrome steel escutcheons plates in all finished areas where piping passes through walls or ceiling.

3.2 HEATING SPECIALTIES

- A. Drain Valves: Shall be installed at all system low points and as indicated, to provide positive water drainage of all system zones and individual heating units. Drain valves shall be globe valves and shall be sized as indicated. Drain valves installed as piping drains shall be equipped with hose nipples.
- B. Water Pressure Reducing Valves: A pressure-reducing valve shall be provided and installed in the cold-water supply to the heating system. The valve shall be set to maintain 15 psi in the system.
- C. Air Vents
 - 1. Air vents shall be provided to eliminate all air from the system and installed as shown on the plan or where required.
 - 2. Drain from automatic air vents shall be as shown on plans, with a ball valve installed in each drain. An air chamber shall be installed at each air vent and shall be line size.
 - 3. Manual air vents shall be installed as required in an accessible location.

3.3 BOILER CONTROL

Install a complete set of boiler controls. All controls shall be compatible with the 120-volt control voltage.

3.4 CIRCULATORS

Furnish and install circulating pumps for the hot water heating systems in location(s) shown on the drawings.

3.5 PIPE INSULATION

- A. GENERAL
 - 1. Provide and install insulation for all surfaces of piping and specialties as indicated and specified.
 - 2. Application shall be by experienced insulation mechanics in a neat and workmanlike manner in accordance with the best practice of the trade using methods recommended by the manufacturer and approved by the Engineer.
 - 3. Systems shall be tested and proven tight, and surfaces painted where required before application of insulation.
 - 4. Surfaces shall be clean and dry before starting and during application.

5. Insulation for piping and sheet metal work operating at temperatures below ambient room temperatures shall be continuous through the wall, floors, partitions, hangers, supports, etc.
6. Insulation shall be neatly finished at pipe hangers, pipe anchors, and pipe covering protection saddles as specified for fittings and valves.

B. Above Grade Heat Piping

1. The entire new water piping system (s) shall be completely insulated and all piping in the Mechanical Spaces.
2. Insulation shall not be applied to the following:
Screwed unions
Valves, flanges, and unions
3. Fittings and joints shall be insulated to a thickness equal to the adjoining pipe insulation.

3.6 SHEET METAL AND DUCTWORK

- A. General - Furnish and install all required sheet metal work and duct systems including: intake ducts, back-draft dampers, weatherhoods, turning vanes, deflectors, operators, louvers and screens, grilles, registers, diffusers, collars, sleeves, stop-offs, baffles, acoustic linings, access doors, flexible connections, supports, etc., for the complete installation as shown on the drawings or noted herein, or required to make the installation complete in accordance with the intent of the drawings and specifications.
- B. Installation: Fabricate and install in accordance with applicable requirements of the ASHRAE Guide and Data Book. Ductwork shall be neat, accurate, rigidly constructed and mechanically tight, as well as substantially airtight and shall provide quiet system of air transportation. Offsets of exposed ductwork shall be made on sides opposite to walls, and ceilings, unless otherwise shown on the drawings or specified. Sizes, as marked on the plans, shall be adhered to as closely as possible. The right is reserved to vary the size of ducts and flues to accommodate structural conditions during the progress of the work, without additional cost to the owner.
- C. All Joints in sheet metal ducts shall be sealed and made airtight and all branches, turns, etc., shall be made with long radius elbows and fittings or shall be provided with fixed air foil turning vanes designed to reduce the resistance of the elbow to the equivalent of a long radius elbow with a throat radius of not less than duct width. Turning vanes shall be Tuttle & Bailey's Ducturns or approved equal.
- D. All ducts shall be installed with necessary offsets, changes in cross sections, etc., and shall be constructed with approved joints and be substantially supported in an approved manner. Ductwork shall have no standing seams.
- E. Access Doors: Shall be installed in building construction, casings, plenum chambers and ducts where shown and wherever else required for ready access to operating parts of any kind.
- F. Registers, Grilles, Diffusers and Louvers: Each air outlet and inlet shall be provided with finished terminal fitting as indicated and in accordance with the drawings and schedule. All items shall be as specified or an approved equal.

- G. Cleaning: Before the duct system is tested and balanced, the interior of all ducts shall be cleaned thoroughly by blowing through the system with the system fan. Cheesecloth shall be secured over each air outlet to entrain dirt and dust during this operation.
- H. Testing and Adjusting: The Contractor shall perform all testing and adjusting necessary to conform to these plans and specifications. Qualified personnel with suitable air-measuring instruments shall adjust all dampers, etc., in the duct systems, and the Contractor shall furnish a written report, in triplicate, stating the volume and velocity of air from each central air handling unit and through each diffuser, grille and register.
- I. Adjustments: After completion of the installation work called for in this specification, the Contractor and his subcontractors shall furnish necessary mechanics or engineers for the adjustment and operation of the plant, to the end that the plant may be perfectly adjusted and turned over to the owners in perfect working order. The Contractor shall further instruct the Owner's authorized representative in the care and operation of the installation providing all required framed instruction charts, directions, etc.

3.7 DUCT INSULATION

- A. Flexible Blanket: Butt all edges of insulation tightly and seal all joints and breaks with tape or flange of a 4" minimum width in accordance with manufacturer's recommendations. All supply air, outside air, and exhaust air ductwork shall be insulated, whether lined with acoustic insulation or not.
- B. Insulation Thickness:
 - 1. Supply ducts inside: 1-½"
 - 2. Supply ducts in attic: R12
 - 3. Return ducts inside: Not insulated
 - 4. Return ducts in attic: R12
 - 5. Exhaust ducts inside: Not insulated, except R6 downstream of ERV
 - 6. Exhaust ducts in attic: R12
 - 7. Outside air ducts in attic: R12
 - 8. Outside air ducts inside: R6

3.8 ELECTRICAL

Furnish and install all low voltage (less than 120 v.) wiring associated with the H.V.A.C. system and its control. All wiring shall be done by licensed electricians and be installed in accordance with the National Electric Code.

3.9 VALVE AND PIPE IDENTIFICATION

Identify all piping and valves according to the following marking system:

- A. Nameplates: Provide and install "Seton" or approved equal, embossed vinyl-plastic nametags with white letters on black background to identify equipment, controls, etc.

- B. Tags and Charts: Attach to each valve a 1-1/2" round or octagonal brass tag with 1/2" indented numerals filled with a durable black compound. In addition to the valve numbers, each tag shall identify the system it controls. Tags shall be securely attached to stems of valves with copper or brass "S" hooks, or chain`. Valve charts shall be provided for each piping system and shall consist of schematic drawings of piping layouts, showing, and identifying each valve and describing its function. Upon completion of the work, one copy of each chart, sealed to rigid backboard with clear lacquer placed under glass and framed, shall be hung where directed. Two additional unmounted copies shall be delivered to the Engineer.

3.10 MAINTENANCE MANUALS AND OPERATING INSTRUCTION

- A. At completion of the work, the Contractor shall provide the Engineer two complete sets of operation and maintenance instructions for all heating and ventilating equipment. These shall be bound together in two notebooks for the owner.
- B. The Owner or his representative shall be completely instructed in the operation of the heating and ventilating system and all its components and advised of good and correct operating and maintenance procedures.

3.11 SYSTEM BALANCE

- A. System balancing work shall be performed by personnel, experienced in HVAC balancing techniques, using state of the art and properly calibrated instrumentation. The Contractor must obtain approval from the Engineer for the balancing program. Three (3) bound, typewritten copies of the balancing report shall be delivered to the Engineer for approval at the completion of the work. If the report is found to be incomplete or inaccurate, the affected portions shall be repeated at no additional cost.
- B. Water Balancing: Adjust the triple duty valves and/or CBV's as necessary to produce the specified flow rates throughout the piping system. Desired flow rates shall be reviewed by the Engineer before start of work.
- C. Air Balancing: Adjust the mixing damper linkages as required to provide the correct percentages of outside air.

Adjust all dampers to deliver the air quantities specified throughout the systems. Review design volume with Engineer prior to proceeding with balance. The balancing contractor shall balance to the design flow rate in each zone with all zone dampers open.

END OF SECTION 23 00 00

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1- GENERAL

1.1 SUMMARY

Section includes testing, adjusting, and balancing of air systems, testing, adjusting, and balancing of hydronic systems, measurement of final operating condition of HVAC systems, sound measurement of equipment operating conditions, vibration measurement of equipment operating conditions.

1.2 REFERENCES

- A. AABC (Associated Air Balance Council) - National Standards for Total System Balance.
- B. ASHRAE 111 (American Society of Heating, Refrigerating and Air-Conditioning Engineers) - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.
- C. NEBB (National Environmental Balancing Bureau) - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

1.3 SUBMITTALS

- A. Test Reports: Indicate data on AABC National Standards for Total System Balance forms, forms prepared following ASHRAE 111, or NEBB Report forms.
- B. Field Reports: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- C. Prior to commencing Work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.
- D. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
- E. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets and indicating thermostat locations.
- F. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty or Copy of NEBB Certificate of Conformance Certification.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance, ASHRAE 111 or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems
- B. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

- A. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this section with minimum three years documented experience certified by AABC or Certified by NEBB.
- B. Perform Work under supervision of AABC Certified Test and Balance Engineer or NEBB Certified Testing, Balancing and Adjusting Supervisor, or registered professional engineer experienced in performance of this Work and licensed in the State of Maine.

1.6 PRE-INSTALLATION MEETING

Convene minimum one week prior to commencing Work of this section.

1.7 SEQUENCING

Sequence balancing between completion of systems tested and Date of Substantial Completion.

1.8 SCHEDULING

Schedule and provide assistance in final adjustment and test of life safety system with Fire Authority.

PART 2 – PRODUCTS Not used.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.

6. Fans are rotating correctly.
 7. Fire and volume dampers are in place and open.
 8. Air coil fins are cleaned and combed.
 9. Access doors are closed, and duct end caps are in place.
 10. Air outlets are installed and connected.
 11. Duct system leakage is minimized.
 12. Hydronic systems are flushed, filled, and vented.
 13. Pumps are rotating correctly.
 14. Proper strainer baskets are clean and in place or in normal position.
 15. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies noted during performance of services, which prevent system balance.

3.2 PREPARATION

Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

3.3 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus 10 percent or minus 0 percent of design.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 0 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.4 ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
- F. Check and adjust systems approximately six months after final acceptance and submit report.

3.5 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.
- B. Make air quantity measurements in main ducts by Pitot tube traverse of entire cross-sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts.
- E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide sheave drive changes as required to vary fan speed. Vary branch air quantities by damper regulation.
- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure.

3.6 WATER SYSTEM PROCEDURE

- A. Adjust water systems, after air balancing, to provide design quantities.
- B. Use calibrated fittings and pressure gauges to determine flow rates for system balance. Where flow-metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open or in normal position to heat transfer elements.

- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.7 SCHEDULES

A. Equipment Requiring Testing, Adjusting, and Balancing

- 1. HVAC Pumps
- 2. Packaged Terminal Air Conditioning Units
- 3. Air Coils
- 4. Air Handling Units
- 5. Fans
- 6. Air Terminal Units
- 7. Air Inlets and Outlets
- 8. Chillers

B. Report Forms

- 1. Title Page:
 - a. Name of Testing, Adjusting, and Balancing Agency
 - b. Address of Testing, Adjusting, and Balancing Agency
 - c. Telephone and facsimile numbers of Testing, Adjusting, and Balancing Agency
 - d. Project name
 - e. Project location
 - f. Project Architect
 - g. Project Engineer
 - h. Project Contractor
 - i. Project altitude
 - j. Report date
- 2. Summary Comments:
 - a. Design versus final performance
 - b. Notable characteristics of system
 - c. Description of systems operation sequence
 - d. Summary of outdoor and exhaust flows to indicate amount of building pressurization
 - e. Nomenclature used throughout report
 - f. Test conditions
- 3. Instrument List:
 - a. Instrument
 - b. Manufacturer
 - c. Model number
 - d. Serial number

- e. Range
- f. Calibration date

4. Electric Motors:

- a. Manufacturer
- b. Model/Frame
- c. HP/BHP and kW
- d. Phase, voltage, amperage; nameplate, actual, no load
- e. RPM
- f. Service factor
- g. Starter size, rating, heater elements
- h. Sheave Make/Size/Bore

5. V-Belt Drive:

- a. Identification/location
- b. Required driven RPM
- c. Driven sheave, diameter, and RPM
- d. Belt, size, and quantity
- e. Motor sheave diameter and RPM
- f. Center to center distance, maximum, minimum, and actual

6. Pump Data:

- a. Identification/number
- b. Manufacturer
- c. Size/model
- d. Impeller
- e. Service
- f. Design flow rate, pressure drop, BHP and kW
- g. Actual flow rate, pressure drop, BHP and kW
- h. Discharge pressure
- i. Suction pressure
- j. Total operating head pressure
- k. Shut off, discharge and suction pressures
- l. Shut off, total head pressure

7. Combustion Test:

- a. Manufacturer
- b. Model number
- c. Serial number
- d. Firing rate
- e. Overfire draft
- f. Gas meter timing dial size
- g. Gas meter time per revolution
- h. Gas pressure at meter outlet
- i. Gas flow rate
- j. Heat input
- k. Burner manifold gas pressure

- l. Percent carbon monoxide (CO)
 - m. Percent carbon dioxide (CO₂)
 - n. Percent oxygen (O₂)
 - o. Percent excess air
 - p. Flue gas temperature at outlet
 - q. Ambient temperature
 - r. Net stack temperature
 - s. Percent stack loss
 - t. Percent combustion efficiency
 - u. Heat output
8. Air Cooled Chiller:
- a. Identification/number
 - b. Location
 - c. Manufacturer
 - d. Model number
 - e. Serial number
 - f. Entering DB air temperature, design and actual
 - g. Leaving DB air temperature, design and actual
 - h. Number of compressors
9. Heating Coil Data:
- a. Identification/number
 - b. Location
 - c. Service
 - d. Manufacturer
 - e. Air flow, design and actual
 - f. Water flow, design and actual
 - g. Water pressure drop, design and actual
 - h. Entering water temperature, design and actual
 - i. Leaving water temperature, design and actual
 - j. Entering air temperature, design and actual
 - k. Leaving air temperature, design and actual
 - l. Air pressure drop, design and actual
10. Air Moving Equipment
- a. Location
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Arrangement/Class/Discharge
 - f. Air flow, specified and actual
 - g. Return air flow, specified and actual
 - h. Outside air flow, specified and actual
 - i. Total static pressure (total external), specified and actual
 - j. Inlet pressure
 - k. Discharge pressure
 - l. Sheave Make/Size/Bore

- m. Number of Belts/Make/Size
 - n. Fan RPM
11. Return Air/Outside Air Data:
- a. Identification/location
 - b. Design air flow
 - c. Actual air flow
 - d. Design return air flow
 - e. Actual return air flow
 - f. Design outside air flow
 - g. Actual outside air flow
 - h. Return air temperature
 - i. Outside air temperature
 - j. Required mixed air temperature
 - k. Actual mixed air temperature
 - l. Design outside/return air ratio
 - m. Actual outside/return air ratio
12. Exhaust Fan Data:
- a. Location
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Air flow, specified and actual
 - f. Total static pressure (total external), specified and actual
 - g. Inlet pressure
 - h. Discharge pressure
 - i. Sheave Make/Size/Bore
 - j. Number of Belts/Make/Size
 - k. Fan RPM
13. Duct Traverse:
- a. System zone/branch
 - b. Duct size
 - c. Area
 - d. Design velocity
 - e. Design air flow
 - f. Test velocity
 - g. Test air flow
 - h. Duct static pressure
 - i. Air temperature
 - j. Air correction factor
14. Duct Leak Test:
- a. Description of ductwork under test
 - b. Duct design operating pressure
 - c. Duct design test static pressure

- d. Duct capacity, air flow
 - e. Maximum allowable leakage duct capacity times leak factor
 - f. Test apparatus
 - 1. Blower
 - 2. Orifice, tube size
 - 3. Orifice size
 - 4. Calibrated
 - g. Test static pressure
 - h. Test orifice differential pressure
 - i. Leakage
15. Flow Measuring Station:
- a. Identification/number
 - b. Location
 - c. Size
 - d. Manufacturer
 - e. Model number
 - f. Serial number
 - g. Design Flow rate
 - h. Design pressure drop
 - i. Actual/final pressure drop
 - j. Actual/final flow rate
 - k. Station calibrated setting
16. Terminal Unit Data:
- a. Manufacturer
 - b. Type, constant, variable, single, dual duct
 - c. Identification/number
 - d. Location
 - e. Model number
 - f. Size
 - g. Minimum static pressure
 - h. Minimum design air flow
 - i. Maximum design air flow
 - j. Maximum actual air flow
 - k. Inlet static pressure
17. Air Distribution Test Sheet:
- a. Air terminal number
 - b. Room number/location
 - c. Terminal size
 - d. Design velocity
 - e. Design air flow
 - f. Test (final) velocity
 - g. Test (final) air flow
 - h. Percent of design air flow

18. Sound Level Report:

- a. Location
- b. Octave bands - equipment off
- c. Octave bands - equipment on
- d. RC level – equipment on

19. Normally acceptable readings, velocity, and acceleration.

END OF SECTION 23 05 93

SECTION 23 11 24 - L.P. GAS SYSTEM

PART 1 - GENERAL

1.1 SCOPE

The work covered by this section includes the furnishing of all labor, materials and incidentals needed to complete L.P. Gas System as indicated on the drawings and/or herein specified or both. All materials and methods shall comply with LP Gas code NFPA 58 and the Maine Fuel Board Laws and Rules.

1.2 GENERAL CONDITION

Refer to Plumbing General Provisions Section 22 00 00 for provisions affecting work in this section.

1.3 WORK INCLUDED

A. The work shall include, but shall not be limited to the following:

1. Complete system including pipe, fittings, hangers, sleeves, etc.

1.4 WORK BY OTHERS

A. The following work, which is incidental to the installation, will be executed by others under the direction of the Plumbing Contractor.

1. Execute all required excavation work, backfilling, grading, etc. (General Contractor)
2. Finish painting of piping, supports except as herein noted.
3. Access panels in ceilings and walls for access to valves.

PART 2 - PRODUCTS

2.1 BASIC MATERIALS AND METHODS

- A. Unless otherwise indicated, the materials to be furnished under this contract shall be standard products of manufacturers regularly engaged in the production of such equipment, and shall be the manufacturer's latest standard design that complies with the specification requirements.
- B. All piping shall be supported from the building structure with pipe hangers. All piping over 2-1/2" shall be supported from top chord of joists.
- C. Branch lines from service or main lines shall be taken off the top of the main, using such cross-over fittings as may be required by structural or installation conditions. All service pipes,

fittings, and valves shall be kept a sufficient distance from other work to permit not less than 1/2 inch from finished covering and such other work, and not less than 1/2 inch between finished coverings on different services.

2.2 CONCEALED AND EXPOSED PIPING

Schedule 40 galvanized steel pipe with approved screwed, flanged, or welded malleable iron or steel fittings. The Contractor at his option may elect to substitute copper or brass in iron pipe sizes for above.

2.3 BURIED PIPING

Piping buried under floor or in ground shall be seamless soft annealed Type "K" copper tubing, without fittings. Gas piping shall be installed in Schedule 40 PVC conduit.

2.4 VALVES

- A. Provide and install bronze, square head, gas cocks at regulators outside, and at boilers.
- B. All gas piping materials and methods shall comply with NFPA pamphlets No. 58.

PART 3 - EXECUTION

3.1 BASIC L.P. GAS PIPING SYSTEM

- A. Furnish and install the complete L.P. gas system essentially as indicated on the drawings connecting to all fixtures and equipment requiring these services.
- B. Piping shall be new, run parallel, and graded evenly to draining points. All vertical offsets shall have a full size drip leg 6" long.
- C. Provide 1/2-inch drain cocks at all low points in system so that all parts of system can be drained.
- D. Piping shall run as high and as close as possible and parallel to ceiling and the walls, or as shown.
- E. All copper tubing shall be cut true; and ends shall be reamed out to full inside diameter of the pipe.
- F. All underground piping, below grade through outer foundation wall, shall be encased in protective pipe. The space between gas piping and sleeve shall be sealed at the foundation or basement wall to prevent entry of gas or water.
- G. No gas piping or tubing shall be laid in contact with cinders and shall be protected against corrosion.

- H. Minimum pitch of pipe shall be no less than 1/4" in 15 feet.
- I. Minimum size shall be 1/2" black iron pipe.
- J. Piping with damaged threads shall not be used.
- K. Piping compounds shall be used sparingly and shall be resistant to the action of gases.
- L. Provide accessible condensate drip pockets and drain valves at all supply drops, low points and points where condensate can collect.

3.2 TESTS

- A. Gas piping shall be blown clear with compressed air and tested with compressed air at 25 lbs. for 8 hours, during which time the pressure drop shall not exceed 1 lb.
- B. Test records shall be kept of each piping installation during the testing and these shall confirm that all piping was pressure tested as required.

END OF SECTION 23 11 24

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes back-draft dampers, duct access doors, volume control dampers, fire dampers, flexible duct connections and duct test holes.

1.2 REFERENCES

- A. NFPA 90A (National Fire Protection Association) - Installation of Air Conditioning and Ventilating Systems.
- B. NFPA 92A (National Fire Protection Association) - Smoke Control Systems.
- C. SMACNA (Sheet Metal Air Conditioning Contractors' National Association) - HVAC Duct Construction Standards - Metal and Flexible.
- D. UL 33 (Underwriters Laboratories, Inc.) - Heat Responsive Links for Fire-Protection Service.
- E. UL 555 (Underwriters Laboratories, Inc.) - Fire Dampers and Ceiling Dampers.
- F. UL 555S (Underwriters Laboratories, Inc.) - Leakage Rated Dampers for Use in Smoke Control Systems.

1.3 SUBMITTALS

- A. Refer to Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit data for shop fabricated assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Submit for Fire and Combination Smoke and Fire Dampers.

1.4 CLOSEOUT SUBMITTALS

- A. Refer to Section 01 77 00 - Closeout Procedures.
- B. Project Record Documents: Record actual locations of access doors test holes.
- C. Operation and Maintenance Data: Submit for Fire Dampers.

1.5 DELIVERY, STORAGE, AND HANDLING

Protect dampers from damage to operating linkages and blades.

1.6 FIELD MEASUREMENTS

Verify field measurements prior to fabrication.

1.7 COORDINATION

Coordinate Work where appropriate with building control Work.

PART 2 - PRODUCTS

2.1 BACKDRAFT DAMPERS

- A. Product Description: Gravity Back-draft Dampers, Size 18 x 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturers standard construction.
- B. Multi-Blade, back-draft dampers: Parallel-action, gravity-balanced, Galvanized 16 gage thick steel, or extruded aluminum. Blades, maximum 6-inch width, with felt or flexible vinyl sealed edges. Blades linked together in rattle-free manner with 90-degree stop, steel ball bearings, and plated steel pivot pin. Provide dampers with adjustment device to permit setting for varying differential static pressure.

2.2 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Fabrication: Rigid and close fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum 1-inch thick insulation with sheet metal cover.
 - 1. Less Than 12 inches square, secure with sash locks.
 - 2. Up to 18 inches Square: Provide two hinges and two sash locks.
 - 3. Up to 24 x 48 inches: Three hinges and two compression latches with outside and inside handles.
 - 4. Larger Sizes: Provide an additional hinge.

2.3 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

B. Splitter Dampers:

1. Material: Same gage as duct to 24 inches size in either direction, and two gages heavier for sizes over 24 inches.
2. Blade: Fabricate of single thickness sheet metal to streamline shape, secured with continuous hinge or rod.
3. Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch.
4. Assemble center and edge crimped blades in prime coated or galvanized frame channel with suitable hardware;
5. End Bearings: Except in round ductwork 2 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings. Provide closed end bearings on all ducts having a pressure classification over 2 inches wg.

C. Quadrants:

1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
2. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases, or adapters.
3. Where rod lengths exceed 30 inches provide regulator at both ends.

2.4 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and SMACNA for Round Industrial Ductwork.
- B. Connector: Fabric crimped into metal edging strip.
1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 30 oz per sq yd.
 2. Net Fabric Width: Approximately 6 inches wide.
 3. Metal: 3 inch wide, 18 gage galvanized steel.
- C. Leaded Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs. per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.
- D. On discharge: - for +2 WG static pressure.
On suction side: -for - 2 WG static pressure.
On suction side: - for - 8 WG static pressure (for exhaust tile piping).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify rated walls are ready for fire damper installation.
- B. Verify ducts and equipment installation are ready for accessories.

3.2 INSTALLATION

- A. Provide back-draft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.
- C. Provide duct test holes where indicated and required for testing and balancing purposes.

3.3 CLEANING

- A. Vacuum clean coils and inside of unit cabinet.
- B. Install new throwaway filters in units at Substantial Completion.
- C. Ventilation units shall run two weeks before final cleaning to flush out all construction dust as required. Change all filters after final cleaning. Cleaning and unit flush out shall comply with ASHRAE Standard 62-2016 Ventilation for Acceptable Indoor Air Quality.

END OF SECTION 23 33 00

SECTION 26 05 00 ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SCOPE

- A. The work covered by this section includes the furnishing of all labor, material, equipment, and incidentals and the performing of all operations in connection with "electrical work" as indicated on the drawings and/or herein specified and including all incidental items to affect a finished and complete job even though such items are not shown or particularly mentioned herein. All work shall be subject to terms and conditions of the contract and applicable portions of the General Conditions and Special Conditions of the Specifications.
- B. All work and material shall be in strict accordance with those plans and specifications, even though they may be in excess of minimum requirements of applicable codes and regulations. The electrical work will include service entrances, metering, telephone, and power panels, lighting, cable TV systems, communications, etc.
- C. The work under this Division is divided into sections for convenience only, and it is not the intent to define or establish the limits of the work or responsibility of the Contractor to provide a complete workable job.
- D. The Contractor shall assume all responsibility to have thoroughly examined the drawings and design criteria including all addenda, facilities and conditions, taken all field measurements of related and connected work, and to have determined the entire scope of the work required for a finished and completed project, in accordance with the drawings and design criteria and as approved by the Engineer. Any questions over conflicting information shown on the drawings and specifications shall be referred to the Engineer for clarification. Any item or object omitted but clearly needed to make a system operate shall be furnished complete.

1.2 COLOR CODING

- A. All wiring except bare equipment grounding conductors shall be color-coded.
- B. The power wiring shall be color-coded with tape, red, blue, and black, for insulated conductors. The neutral shall be white or gray. Comply with National Electrical Code (NEC), Article 210. Use green or green with yellow stripe for equipment ground.

1.3 INCIDENTAL WORK BY OTHERS

- A. Excavation, trenching, backfill, outdoor pole bases, cutting and patching by General Contractor.
- B. Cost of Electric power during construction to be paid by General Contractor
- C. Finish painting by Painting Contractor

1.4 CODES, PERMITS, INSPECTIONS

- A. The installation shall comply with all laws applying to the electrical installation in effect at the site with regulations of any other governmental body or agency having jurisdiction, and with the regulations of the NEC where such regulations do not conflict with those laws.
- B. The communications conduits, panelboards and outlets shall be installed to conform with the requirements of the Owner and Communications Company. The Contractor shall verify work (as shown on plans and specified) with the Engineer before installation.
- C. The Contractor shall obtain and pay for all permits required by the ordinances at the site. After completion of the work, the Contractor shall furnish to the Engineer, for the Owner, a certificate of final inspection and approval from the authority having jurisdiction.

1.5 EXTRA WORK ORDERS - CREDITS

- A. No extra work will be paid unless authorized by the Engineer in writing. Where extra work is required, the Contractor shall provide an itemized account for the work or materials involved and shall take into consideration any credits due or work omitted for any reasons. Estimates shall clearly list such omitted work with proper credit given for same.
- B. Amounts of credits for work omitted and/or substitutions shall be approved by the Engineer and/or Owners. All credit submittals and approvals shall be in writing.

1.6 STANDARDS

- A. All materials, equipment and installation shall comply with the following:
 - 1. The NEC, latest approved edition.
 - 2. Any and all Federal, State and/or local codes, applicable ordinances, and regulations.
 - 3. Latest approved standards of IEEE, ANSI, NEMA, and NFPA.
 - 4. Local utility and telephone company regulations.
 - 5. All equipment shall be new and U.L. listed where listing is available.

1.7 SUBSTITUTIONS

- A. Where equipment and materials are indicated "or equivalent" substitution of items equal in quality, performance, rating, and appearance will be permitted upon specific review in writing by the Engineers before installation. Specific criteria for substitution of certain equipment are defined elsewhere.
- B. In all cases, the right is reserved to require adequate proof of the equality and acceptability of the substitute before permitting its use. The Contractor shall assume the cost and the entire responsibility for any changes in any phase of building construction, as shown on the contract drawings or required by the specifications, which may be occasioned by review of materials and equipment other than that specified.

1.8 GUARANTEE - WARRANTY

- A. This Contractor shall and hereby does warrant and the General Contractor shall and hereby does guarantee that all work executed under this section will be free from defects of materials and workmanship for a period of one (1) year from the date of the final certificate.
- B. This Contractor shall further warrant that all materials furnished are new and that the work executed is in accordance with all applicable laws, regulations, etc.

1.9 MATERIALS

Material specifications are included hereinafter under each specific section.

1.10 EQUIPMENT

Equipment specifications are included hereinafter under each specific section.

1.11 TEMPORARY POWER

- A. Temporary power for all trades will be provided by the Contractor, and the cost of electrical power shall be borne by the General Contractor.
- B. The Contractor shall furnish at least a 200-amp single-phase service, 115/230 volts with a 200-watt lamp connection for each 1000 square feet. (No lamp shall be furnished by the Contractor.)

Furnish grounded duplex outlets as required. Outlets shall be located so that 50' extension (fbo) will reach any point. Power to outlets shall be limited to 1/2 HP motors 115/240 volts. If additional power is required it shall be furnished by others.

1.12 SITE VISITATION

Due to the nature of the work, certain details of the site may not be shown or specified. The Contractor should visit the site and failure to do this shall not relieve the responsibility of the Contractor, as no additional payments or extras will be allowed for conditions encountered in the execution of the work in accordance with the intent of the plans and specifications.

1.13 WORK PROGRESS

- A. The Contractor shall coordinate his work with the progress of the building and other trades such that he shall complete his work as soon as conditions permit. Any overtime or additional costs incurred by a lack of improper coordination with other trades shall be borne by the Contractor without any additional costs to the Owner.
- B. Waste material shall be removed promptly from the premises. All material and equipment stored on the premises shall be kept in a neat and orderly fashion and protected from exposure and the weather.

1.14 TESTS

- A. After the interior wiring system installation is completed and at such time as the Engineer or Owner may direct, the Contractor shall conduct an operating test for approval. The equipment shall be demonstrated to operate in accordance with the requirements of this specification. The tests shall be performed in the presence of the Owner, Engineer, or their authorized representative. The Contractor shall furnish all instruments and personnel required for the tests, and the Owner will furnish the necessary electric power.
- B. Special tests required for certain systems may be detailed elsewhere in this specification.

1.15 AS BUILT DRAWINGS

The Contractor shall submit a neatly marked up set of Electrical Drawings to the Engineer for record of final installation as actually installed. This copy will be returned to the Owner after records are made.

1.16 EXCESS COSTS

The contractor **shall carry in his bid any "excess cost"** charged by the local utility company for items such as poles, wire, conduit, transformers, meter connections, etc. to bring the required electrical service to the building.

1.17 UNUSED ELECTRICAL WORK

Remove all unused electrical work that will be exposed on completion of the work. All existing unused electrical equipment shall become the property of the contractor and be removed from the premises.

1.18 EXTERIOR AIR INFILTRATION/EXFILTRATION ELIMINATION:

Provide Air Sealing of all electrical devices, junction boxes, and fixture boxes at outside walls and insulated ceilings using Lessco™ Air Vapor Barrier Boxes, or approved equal. Install per manufacturer recommendations.

END OF SECTION 26 05 00

SECTION 26 05 19 - POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SCOPE

- A. All conductor material, insulation and fittings shall meet National Electrical Code (NEC) requirements. All conductors and fittings shall be U.L. listed. All conductors shall be listed for 600 volt A.C. All conductors shall be sized to meet the NEC ampacity and voltage drop requirements.
- B. Minimum size power wiring shall be #12 AWG. Minimum size control wiring shall be #16 AWG. Branch circuit conductor #8 and larger must be stranded.
- C. Branch wiring over 90 feet long must not be smaller than #10 AWG at 120 volts and over 150 feet at 208 volts.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Conductors #12, #10 and #8 may be either TW or THW. Larger sizes shall be THW. All wire #8 and larger must be stranded.
- B. Ground wire for use above ground shall be bare annealed copper or shall be insulated green or green with yellow stripes.
- C. Lugs for power conductor termination in switchgear, panelboards, etc., shall be compression type. Lugs shall be U.L. listed for cu/al.
- D. Connectors for #6 AWG and larger shall be compression type, U.L. listed for cu/al.
- E. Splices of wire sizes up through #8 may be wire nuts similar to U.L. listed Wing Nuts, Buchanan B caps or equivalent.
- F. Direct burial wire (if shown on plans) shall be Type U.F. copper. GE #51-58-51 or 58050/2 Southern Triangle or equivalent.
- G. Electrical tape shall be Scotch #88, 3M or equivalent.
- H. Conductors #2 AWG and larger may be aluminum providing the following items are adhered to:
 - 1. The ampere capacity, voltage drop and conduit fill is in accordance with the NEC and equal to copper specified on plans.
 - 2. Prior to making any connection the aluminum wire is to be brushed and an oxide inhibitor applied.
 - 3. Lugs and connectors are to be rated cu/al compression type.

4. Termination of aluminum conductors at heat producing equipment such as motors or heaters is not acceptable.
5. Grounding jumpers shall be copper and equipment ground wires shall be copper.
6. The Electrical Contractor shall submit a list to the Engineer of feeder conductors indicating size, insulation and circuit for which substitutions are to be made.
7. Furnish U.L. listed aluminum to copper connectors MacAdept, 3M, or equivalent for aluminum termination of feeders at panels.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Splices for #6 and larger shall be by compression connectors.
- B. Follow the NEC Rules when homeruns are combined in a single conduit.
- C. Tape all bare surfaces of conductors with a minimum of 2 half lapped layers of electrical tape.
- D. Torque all electrical connections at panels per manufacturer's recommendations.
- E. Sleeve all direct burial cable in galvanized rigid steel or Schedule 40 PVC under paving and through masonry walls and footings.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SCOPE

- A. The grounded conductor and equipment grounding conductors shall be connected from the service entrance equipment to the building ground electrode by the grounding electrode conductor in accordance to National Electrical Code (NEC) regulations, Article 250, and Utility requirements.
- B. Metal conduit shall be grounded in accordance to NEC requirements; but in addition to this, equipment-grounding conductors shall be furnished and installed and sized per plans.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Grounding electrode and equipment ground conductors shall be copper and sized per plans.
- B. Ground rods shall be copper clad steel, 3/4" dia. 10' long.

2.2 CONDUCTORS

- A. Insulated Conductors shall be copper wire or cable insulated 600 V unless otherwise required.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Bonding Cable: 28kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 - 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferules; 1-5/8 inches wide and 1/16 inch thick.
- C. Grounding Bus shall be predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32 inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and impulse tested at 5000 V.

2.3 CONNECTORS

- A. Connectors shall be listed and labeled by an authorized testing lab.
- B. Bolted Connectors for Conductors and pipes shall be copper or copper alloy pressure type with at least two bolts properly sized.

- C. Welded Connectors shall be with exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors shall be mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.4 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; ¾ dia, 10' long.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All grounding shall be in strict compliance with the NEC and these specifications.
- B. All equipment grounding conductors shall be bare copper or insulated copper with green jacket or green with yellow stripe or green tape as covered by the code.
- C. The bonding/grounding jumpers shall be sized by NEC Table 250.66. All grounding and bonding in the building must comply with the latest issue of the NEC.
- D. All metallic conduit used with power wiring shall be bonded to provide an effective ground. Use PVC conduit for service grounding conductors.
- E. Install ground rods as indicated with approved connectors.

3.2 APPLICATIONS

- A. Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Install bare copper conductor, No 2/0 AWG minimum for underground conductors.
 - 1. Bury at least 24 inches below grade.
 - 2. Bury duct bank grounding conductor 12 inches above duct bank when indicated as part of duct-bank installation.
- C. Isolated Grounding Conductors shall have green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
 - 1. Install bus on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.

2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.

D. Conductor Terminations and Connections

1. Pipe and Equipment Grounding Conductor Terminations shall be bolted connectors.
2. Underground Connections shall be welded connectors except at test walls and as otherwise indicated.
3. Connections to Ground Rods at Test Wells shall be bolted connectors.
4. Connections to Structural Steel shall be Welded connectors.

3.3 GROUNDING OVERHEAD LINES

- A. Comply with grounding requirements.
- B. Drive ground rods until tops are 12 inches below finished grade in undisturbed earth.
- C. Ground-Rod Connections: Install bolted connectors for underground connections and connections to rods.
- D. Secondary Neutral and Transformer Enclosure: Interconnect and connect to grounding conductor.

3.4 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- C. In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A for signal and communication equipment.
 1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in race way from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a ¼-by-4-by-12-inch grounding bus.
 3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- D. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.5 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Install Bonding Straps and Jumpers in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping:
 - 1. Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- E. Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.
- F. Install a driven ground rod at base of each building corner column and at intermediate exterior columns at distances not more than 60 feet apart.
- G. All grounding shall be in strict compliance with the NEC and these specifications.
- H. All equipment grounding conductors shall be bare copper or insulated copper with green jacket or green with yellow stripe or green tape as covered by the code.
- I. The bonding jumpers shall be sized by NEC Table 250-95. All grounding and bonding in the building must comply with the latest issue of the NEC.

- J. All metallic conduit used with power wiring shall be bonded to provide an effective ground. Use PVC conduit for service grounding conductors.
- K. Install ground rods as indicated with approved connectors.

3.6 FIELD QUALITY CONTROL

- A. Perform Tests and Inspections.
 - 1. Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Report Measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment of System with Capacity of 500 kVA and Less: 10 ohms.
- C. If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

SECTION 26 05 28 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SCOPE

- A. All inserts and anchors and hardware necessary for the support of electrical equipment shall be furnished under this section of the specifications.
- B. Apparatus shall be mounted to walls, columns, or machine frames (with 1/4" separation from same) and all necessary spacers, brackets, structural pieces, inserts, anchors and bolts necessary for this purpose shall be provided.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Wooden plugs inserted in masonry or concrete shall not be used as a base to fasten conduit supports. Conduit shall be supported on approved types of galvanized wall brackets, ceiling trapeze, strap hangers, or pipe straps, secured by means of toggle bolts, on hollow masonry units or expansion bolts in concrete or brick, machine screws on metal surfaces and wood construction.
- B. Where indicated, 3/4" plywood panels shall be wall mounted to support electrical and telephone equipment. Plywood shall be fire-rated and painted black.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Conduit systems shall be installed in accordance with the applicable provisions of the National Electrical Code (NEC).
- B. Conduit shall be installed in such manner as to insure against trouble from the collection of trapped condensation, and all runs of conduit shall be arranged so as to be devoid of traps wherever possible. The Contractor shall exercise the necessary precautions to prevent the lodgment of dirt, plaster or trash in conduit, fittings and boxes during the course of installation. A run of conduit which has become clogged shall be entirely freed of this accumulation, or shall be replaced.
- C. Conduit shall be securely fastened to all cast or sheet metal equipment, junction, or pull boxes with galvanized locknuts and bushings care being observed to see that the full number of threads project through which the locknut shall be made up sufficiently tight to draw the bushing into firm electrical contact with the box.

- D. Plywood panels shall be attached with hardware sized to support the weight of the equipment and the panels shall be painted gray with two coats of paint.
- E. Install exposed surface mounted devices or equipment less than 8' AFF with Ramset anchors or equivalent to masonry walls, size 1/4" x 1" or larger as required.

END OF SECTION 26 05 28

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SCOPE

Provide all hangers and supports for electrical equipment and systems as required.

PART 2 –PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support System shall comply with MFMA-4, factory-fabricated components for field assembly EQUAL TO Unistrut, Tyco International, Ltd.
 - 1. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 2. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
- B. Raceway and Cable Supports shall be as described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices shall be steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints shall be ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners shall be threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used equal to Hilti, Inc.
 - 2. Mechanical-Expansion Anchors shall be insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used equal to Hilti, Inc.
 - 3. Concrete Inserts shall be steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 - 4. Clamps for Attachment to Steel Structural Elements shall meet MSS SP-58, type suitable for attached structural element.

5. Through Bolts shall be structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts shall be all-steel springhead type.
7. Hanger Rods shall be threaded steel.

PART 3 – EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Space supports for tubing or conduit as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits for multiple raceways or cables.
 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements unless otherwise specified.
- B. Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- C. Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 1. To Wood: Fasten with lag screws or through bolts.
 2. To New Concrete: Bolt to concrete inserts.
 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 4. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
 6. To Light Steel: Sheet metal screws.

- 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

- A. Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring. The raceway and fittings shall include the conduit, wireway, and flexible metal conduit systems and their associated fittings as shown on the plans and in the specifications. The material herein described shall be approved for the service and shall be Underwriters Laboratories listed at the time of installation in every case where such a standard has been established.

1.2 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.
- C. FMC: Flexible metal conduit.
- D. LFMC: Liquidtight flexible metal conduit.
- E. NBR: Acrylonitrile-butadiene rubber.
- F. RNC: Rigid nonmetallic conduit.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 3. Electri-Flex Co.
 - 4. Maverick Tube Corporation.
 - 5. Wheatland Tube Company.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. EMT: ANSI C80.3.
- D. FMC: Zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket.

- F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

- 1. Fittings for EMT: Steel, compression type.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. AFC Cable Systems, Inc.
 - 2. Arnco Corporation.
 - 3. CertainTeed Corp.; Pipe & Plastics Group.
 - 4. Electri-Flex Co.
 - 5. Thomas & Betts Corporation.

- B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise specified.

- C. LFNC: UL 1660.

- D. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.

- E. Fittings for LFNC: UL 514B.

2.3 METAL_WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Cooper B-Line, Inc.
 - 2. Square D; Schneider Electric.

- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.

- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

- D. Wireway Covers: Screw-cover type.

- E. Finish: Manufacturer's standard enamel finish.

2.4 SURFACE_RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Thomas & Betts Corporation.
 - b. Walker Systems, Inc.; Wiremold Company.
 - c. Wiremold Company; Electrical Sales Division.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Cooper Industries, Inc.
 2. Hubbell Incorporated.
 3. Thomas & Betts Corporation.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Metal Floor Boxes: Sheet metal, fully adjustable, rectangular.
- F. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- G. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Nonmetallic Enclosures: Plastic.
- H. Cabinets:
 1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.

2.6 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. Description: Comply with SCTE 77.
 1. Color of Frame and Cover: Gray.
 2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.
 3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.

4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 5. Cover Legend: Molded lettering, as indicated for each service.
 6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 7. Handholes 12 inches wide by 24 inches long and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armorcast Products Company.
 - b. Carson Industries LLC.
 - c. CDR Systems Corporation.

PART 3 – EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
1. Exposed Conduit: Rigid steel conduit.
 2. Concealed Conduit, Aboveground: Rigid steel conduit.
 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
 4. Connection to Vibrating Equipment including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment: LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Comply with the following indoor applications, unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit.
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 5. Connection to Vibrating Equipment including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment: FMC, except use LFMC in damp or wet locations.
 6. Damp or Wet Locations: Rigid steel conduit.
 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, nonmetallic in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements unless otherwise indicated.
- B. Keep raceways at least 12" away from parallel runs of flues and steam or hot-water pipes, 8" if crossing, 2" if insulated. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- E. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- F. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1", parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Change from NMC to rigid steel conduit before rising above the floor.
- G. Raceway Terminations at Locations Subject to Moisture or Vibration shall include the use of insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- H. Install pull wires in all raceways. Leave at least 24" of slack at each end of pull wire.
- I. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- J. Set metal floor boxes level and flush with finished floor surface.

3.3 INSTALLATION_OF_UNDERGROUND_CONDUIT

- A. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom for pipe less than 6 inches in nominal diameter.
 - 2. Install backfill. This work shall be the responsibility of the Division 31 contractor.
 - 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.
 - 4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
 - 5. Bury warning tape approximately 12" below the finished grade (2" below slab).

END OF SECTION 26 05 33

SECTION 26 05 43 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

- A. Provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install underground duct banks, manholes and handholes including all necessary excavation, backfill and surface restoration.
- B. Provide underground conduit duct banks with manholes and pull boxes for power, and lighting circuits as shown on the Drawings.
- C. Coordination: Duct bank routing when shown on the Drawings is diagrammatic. Coordinate installation with piping and other underground systems and structures and locate clear of interferences. Coordinate manhole and handhole installation with piping, sheet piling and other underground systems and structures and locate clear of interferences.

1.2 REFERENCES

A. Reference Standards:

- 1. National Electrical Manufacturers Association (NEMA)
- 2. The American National Standards Institute (ANSI)
- 3. The Institute of Electrical and Electronic Engineers (IEEE)
- 4. Insulated Cable Engineers Association (ICEA)
- 5. National Electrical Code (NEC)
- 6. National Electrical Safety Code (NESC)
- 7. ANSI A14.3, Safety Requirements for Fixed Ladders
- 8. OSHA
- 9. ASTM
 - a. ASTM A 48, Gray Iron Castings
 - b. ASTM D756, Procedure E: Accelerated Service Exposure
 - c. ASTM G53: Recommended Practice for Operating Light and Water Exposure on Nonmetallic Materials (with a U.V.A. 340 bulb)
 - d. ASTM D570, Section 5, 6.1, 6.5: Water Absorption
 - e. ASTM D790: Flexural Properties
 - f. ASTM D635: Flammability Test

B. Definitions:

- 1. Duct: Electrical conduit and other raceway, either metallic or nonmetallic, used underground, embedded in earth or concrete.
- 2. Duct bank: 2 or more conduits or other raceway installed underground in the same trench or concrete envelope.
- 3. Handhole: An underground junction box in a duct or duct bank with cover accessible

from grade.

4. Manhole: An underground utility structure, large enough for a person to enter, with facilities for installing and maintaining cables. Where required manholes shall comply with the Utility Companies requirements.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Sequencing, and Scheduling: per Contract Documents.

1.4 SUBMITTALS

- A. Submit in accordance with Division 01 General Requirements.

- B. Shop Drawings:

1. Layouts showing the proposed routing of duct banks and the locations of manholes, handholes and areas of reinforcement
2. Profiles of duct banks showing crossings with piping and other underground systems
3. Typical cross sections
4. Installation procedures
5. Manufacturer's technical information for manholes, handholes and accessories proposed for use
6. Drawings showing interior and exterior manhole and handhole dimensions and details of openings, jointing, inserts, reinforcing, size and locations of openings, and accessory locations
7. Certificate of concrete and steel used in underground pre-cast concrete utility structures, according to ASTM C858
8. Product Data for nonmetallic conduit and manhole accessories

- C. Record Drawings:

1. Layouts showing the actual routing of duct banks including the dimensions and depth of the top of duct bank below grade. Record Drawings for duct banks should also include cross sections of the duct bank indicating the circuit, use, conduit size, orientation and number of conduits.
2. Locations of manholes, handholes, and areas of reinforcement.

1.5 QUALITY ASSURANCE

- A. Provide in accordance with Contract Documents.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Contract Documents.

1.7 SITE CONDITIONS

- A. Existing Conditions: per Contract Documents.

PART 2 – PRODUCTS

2.1 DUCT BANK CONDUIT

- A. Duct: Schedule 40 and Schedule 80 PVC conduit and fittings in accordance with Division 26, Section Raceways and Boxes for Electrical Systems.
- B. Rigid Steel Conduit: Rigid steel conduit and fittings in accordance with Division 26, Section Raceways and Boxes for Electrical Systems.

2.2 HANDHOLES

- A. The pull/splice box underground enclosures shall be constructed of polymer concrete consisting of sand and aggregate bound together with a polymer resin. Internal reinforcement may be provided by means of steel, fiberglass, or a combination of the two. Handholes for installation in roadways shall be concrete reinforced H20 traffic rated.
- B. Enclosure:
 - 1. The enclosure must be manufactured with an open or closed bottom and a removable cover. The enclosures shall be green or concrete gray in color.
 - 2. The enclosures shall be designed to be installed flush to grade with the cover fitting flush to the box.
 - 3. The enclosures shall be suitable for installation in either direct or buried native soil, embedded in concrete, or embedded in asphalt surfacing. (A concrete collar is required for installation in asphalt).
 - 4. The enclosures shall be of a stackable design for greater installation flexibility.
 - 5. All covers are to be equipped with a minimum of two stainless steel lockdown mechanisms. All covers shall have a logo recessed into the cover and it shall read ELECTRIC.
 - 6. All enclosure covers will have some type of recessed access point to allow removal of the cover with a hook. The access points will be placed in such a location to allow for the greatest amount of leverage and safety possible.
 - 7. Enclosures shall be designed and suitable for installation and use through a temperature range of minus 40°C (minus 40°F) to 60°C (140°F).
 - 8. A certified copy of all test reports must be signed and stamped by a registered professional Engineer and submitted prior to shipment of products.

C. Material Requirements:

1. Permanent deflection of any surface shall not exceed 10 percent of the maximum allowable static design load deflection.
2. The covers shall be skid resistant and have a maximum coefficient of friction of 0.50 on the top surface of the cover. Coatings will not be allowed.
3. Any point on the covers must be able to withstand a 70 foot-pound impact administered with a 12-pound weight having a "C" tup (ASTM D-2444) without puncturing or splitting. The test shall be performed with the cover resting on a flat, rigid surface such as concrete or a 1 steel plate.
4. Covers shall have molded lettering, ELECTRIC or COMM as applicable
5. Fastening devices used to secure the cover to the box shall be capable of withstanding a minimum torque of 15 foot-pounds and minimum straight pullout strength of 750 pounds.
6. The material is tested according to the requirements of ASTM D543, Section 7, Procedure 1, for chemical resistance. The manufacturer is responsible for proof of compliance with the latest version of the ASTM standards.
7. Comply with the following acceptance standards:
 - a. ASTM D756
 - b. ASTM G53
 - c. ASTM D570
 - d. ASTM D790
 - e. ASTM D635

- D. Acceptable level of quality for handholes: equivalent to Strongwell Quazite, or approved equal.

2.3 SOURCE QUALITY CONTROL

- A. Provide in accordance with Contract Documents.

PART 3 – EXECUTION

3.1 GENERAL

- A. Concrete shall be measured, mixed and placed, and compacted as required in Division 03.
- B. Provide not less than 3 inches of concrete between the outside of a duct and the earth. Provide not less than 2 inches of concrete between adjacent ducts. Refer to Drawings for spacing requirements. Provide side forms for each duct bank.
- C. All duct line concrete pours shall be continuous between manholes or handholes and between manholes or handholes and structures.
- D. Where duct lines pass through concrete walls, concrete envelopes shall be extended through

the finished flush with inside surfaces. Watertight construction joints of an approved type shall be provided.

- E. Duct banks shall be reinforced when laid on backfill covering new pipelines, roads, parking lots or any are subject to vehicular traffic. Beneath these areas, install reinforcing bars as shown on the Drawings, extending 10 feet beyond area needing protection.
- F. Duct lines shall be laid in trenches on mats of gravel not less than 6 inches thick and well graded.
- G. All electrical duct banks shall be colored red for safety purposes.
- H. Install raceways to drain away from buildings. Raceways between manholes or handholes shall drain toward the manholes or handholes. Raceway slopes shall not be less than 3 inches per 100 feet.
- I. Make raceway entrances to buildings and vaults with hot dipped rigid galvanized steel conduit not less than 10 feet long. Conduits which are not concrete encased for runs below floor slabs in slab-on-grade construction shall be hot dipped rigid galvanized steel conduit. Conduits which are concrete encased for runs below floor slabs in slab-on-grade construction shall be encased under the slab to their respective equipment.

3.2 PROJECT CONDITIONS AND COORDINATION

- A. Coordination with other Underground Utilities:
 - 1. Locate all existing underground utilities through the use of an underground utility piping location Services Company. Locate the existing underground utilities and piping before any excavation is to begin.
 - 2. Coordinate conduit routing, duct bank and manholes with other new and existing underground utilities. Revise locations and elevations as required to suit field conditions and ensure that conduits, duct runs, manholes, and handholes do not interfere with existing and new underground utilities and piping.

3.3 INSTALLATION

- A. Provide excavation and backfilling required for duct bank manhole and handhole installation.
- B. Make duct bank installations and penetrations through foundation walls watertight.
- C. Assemble duct banks using non-magnetic saddles, spacers, and separators. Position separators to provide 3-inch minimum separation between the outer surfaces of the ducts.
- D. Firmly fix ducts in place during pouring of concrete. Carefully spade and vibrate the concrete to insure filling of all spaces between ducts.

- E. Make bends with sweeps of not less than 48-inch radius or 5 degree angle couplings.
- F. Make a transition from non-metallic to rigid steel conduit where duct banks enter structures or turn upward for continuation above grade. Terminate the ducts in insulated grounding bushings. Continue ducts inside buildings with steel, metallic conduit.
- G. Where ducts enter manholes and handholes, terminate the ducts in suitable end bells.
- H. Provide expansion/deflection fittings in accordance with the requirements specified in Division 26, Section Raceways and Boxes for Electrical Systems.
- I. Do not backfill with material containing large rock, paving materials, cinders, large or sharply angular substances, corrosive material, or other materials that can damage or contribute to corrosion of ducts or cables or prevent adequate compaction of fill.
- J. Slope duct runs for drainage toward manholes and away from buildings with a slope of approximately 3 inches per 100 feet.
- K. After completion of the duct bank and prior to pulling cable, pull a mandrel, not less than 12 inches long and with a cross section approximately 1/4 inch less than the inside cross section of the duct, through each duct. Then pull a rag swab or sponge through to make certain that no particles of earth, sand or gravel have been left in the duct.
- L. Install a bare stranded copper duct bank ground cable in each duct bank envelope. Make ground electrically continuous throughout the entire duct bank system. Connect ground cable to building and station ground grid or to equipment ground buses. In addition, connect ground cable to steel conduit extensions of the underground duct system. Provide ground clamp and bonding of each steel conduit extension, where necessary to maintain continuity of the ground system. Terminate ground conductor at last manhole or handhole for outlying structures.
- M. Install a warning ribbon approximately 12 inches below finished grade over all underground duct banks. The identifying ribbon shall be a PVC tape, 3 inches wide, yellow color, permanently imprinted with CAUTION BURIED ELECTRIC LINE BELOW in black letters.
- N. Plug and seal all empty spare ducts entering buildings and structures. Seal all ducts in use entering buildings and structures. Seal shall be watertight, O-Z/Gedney Type Dux Duct Sealing Compound or equal.
- O. Install duct banks in conformance with National Electrical Code and National Electrical Safety Code.
- P. Install manholes and handholes where shown on Drawings. Verify final locations in field.
- Q. Complete installation of manholes and handholes so that structures are watertight. Provide expansion/deflection fitting for each conduit entry into the manholes.

- R. Conduits shall extend 3 inches above concrete slab surface, unless otherwise indicated. All conduits shall be bushed to protect cables and provide means for grounding.
- S. Duct Bank Conduit Spacers: Non-metallic, snap together intermediate and bottom pieces, sized for conduit diameter and code spacing. Carlon Span-Loc or approved equal. Separators shall be compatible with the conduit utilized. The joints of the conduits shall be staggered by rows and layers to provide a duct line having the maximum strength. During construction, partially completed duct lines, shall be protected from the entrance of debris such as mud, sand, and dirt by means of suitable conduits plugs. As each section of a duct line is completed, a testing mandrel not less than 12 inches long with a diameter 1/4 inch less than the size of the conduit, shall be drawn through each conduit, after which a brush having the diameter of the duct, and having stiff bristles shall be drawn through until the conduit is clear of all particles of earth, sand and/or gravel; conduit plugs shall then be immediately installed. Provide a plastic pull rope, having a minimum of 3 additional feet at each end, in all spare ducts.

3.4 DUCT BANK INSTALLATION

- A. All bends shall have a radius greater than 36 inches or 12 times conduit inside diameter whichever is greater.
- B. Install duct with minimum slope of 4 inches per 100 feet. Slope duct away from building entrances.
- C. Install no more than equivalent of three 90-degree bends between pull points.
- D. Provide suitable fittings to accommodate expansion and deflection where required.
- E. Use suitable separators and chairs installed not greater than 4 feet on centers. Conduit separation shall be per code, and not less than 3 inches.
- F. Securely anchor duct to prevent movement during concrete placement. Use re-bar holders at spacers and secure with No. 4 re-bar driven into the earth at a minimum of 1 foot.
- G. Tops of concrete-encased ducts shall be:
 - 1. Not less than 24 inches and not less than shown on the Drawings, below finished grade.
 - 2. Not less than 30 inches and not less than shown on the Drawings, below roads and other paved surfaces.
- H. Tops of direct burial ducts and conduits shall be:
 - 1. Not less than 24 inches and not less than shown on the Drawings, below finished grade.
 - 2. Not less than 30 inches and not less than shown on the Drawings, below roads and other paved surfaces.

3.5 CABLE PULLING

- A. The inspection, handling, storage, temperature conditioning prior to installation, bending and training limits, pulling limits, and calculation parameters for installation of all cables must comply with the manufacturer's recommendations. For ease of installation and prevention of cable damage, the Contractor shall utilize quadrant blocks located properly along the cable run. Failure to comply with any of the above shall make this Contractor responsible for any cable failures that occur within the manufacturer's Warranty Period.
- B. Cable lubricant shall be soapstone, graphite, or talc for rubber or plastic jacketed cables.
- C. Lubricants for assisting in the pulling of jacketed cables shall be those specifically recommended by the cable manufacturer.
- D. Cable pulling tensions shall not exceed the maximum pulling tensions recommended by the cable manufacturer.
- E. All medium voltage cables shall be individually fire/arc proofed.

3.6 CABLE TERMINATING

- A. Terminations of insulated power and lighting cables shall be protected from accidental contact, deterioration of coverings and moisture by the use of terminating devices and materials. Terminations shall be made using materials and method as indicated or specified herein or as designed by the written instruction of the cable manufacturer and termination kit manufacturer.

3.7 GROUNDING

- A. Duct banks shall be grounded with a bare stranded copper ground wire that is run within the duct bank and is bonded and grounded at both ends. Conduit shall not be used as the ground conductor.
- B. Manholes shall be grounded with ground rods. A bare stranded copper ground wire from the ground wire loop shall be used to bond together and ground the manhole cover frame, ladder support bracket, concrete inserts, cable racks, duct bank ground conductors, and the shields of any medium voltage cables that are spliced in the manhole.
- C. Grounding: Install a ground rod for each manhole. Bond all exposed metal manhole accessories and the concrete reinforcing rods with bare copper wire and connect to the ground rod and to the duct bank ground cable. Provide foam sealant for rod penetration in manhole floor for watertight seal.
- D. Install a bare stranded copper duct bank ground cable in each duct bank envelope. Make ground electrically continuous throughout the entire duct bank system. Connect ground cable to building and station ground grid or to equipment ground buses. In addition, connect ground cable to steel conduit extensions of the underground duct system, manholes, and handholes. Provide ground clamp and bonding of each steel conduit extension, where necessary to maintain continuity of the ground system.

3.8 FIELD QUALITY CONTROL

- A. Provide in accordance with Contract Documents.

3.9 STARTUP & COMMISSIONING

- A. Provide in accordance with Contract Documents.

END OF SECTION 26 05 43

SECTION 26 05 83 - WIRING CONNECTIONS

PART 1 - GENERAL

1.1 SCOPE

- A. All equipment shown on the electrical plans shall be wired by the Contractor.
- B. The Contractors shall furnish and install their equipment and the Contractor shall wire them as shown on the plans and per manufacturer's instructions.
- C. All electrical work shall comply with the National Electrical Code (NEC) and all equipment shall be U.L. listed.
- D. Furnish shop drawings of starters, relays, and disconnect switches.
- E. Furnish all wire, conduit, fittings etc. to make all connections and complete all electrical work (equipment by others).

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Disconnects shall be per Section 26 06 20 and this section.
- B. Raceway and conductors shall be per Section 26 05 33, 26 06 20, and 26 27 26.
- C. Motor starter overload heaters sized for the actual motor shall be furnished.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Contractor shall wire line voltage power and line voltage control wiring to all equipment. The Contractor shall install wiring to the equipment in flexible metallic conduit using liquid tight flexible metal conduit where exposed to moisture.
- B. Control wiring shall be sized and protected as required by the NEC.
- C. The Contractor will furnish fuses sized by the NEC.
- D. Install motor disconnects in sight of the motor or provide lockable disconnects in compliance with the NEC.

E. All motor disconnects and starters shall have name plates indicating motor being controlled.

END OF SECTION 26 05 83

SECTION 26 06 20 - ELECTRICAL DISTRIBUTION

PART 1 - GENERAL

1.1 SCOPE

- A. Furnish and install all panelboards, load centers, disconnect switches, cabinets and boxes as required by the drawings, specifications and by the National Electrical Code (NEC).
- B. Submit shop drawings for all switches, panelboards, and circuit breakers.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Load centers and panelboards shall be U.L. listed, have main lugs as sized on plans and shall be furnished with active breakers, spare breakers and space (as shown on the plans). (Meet Fed. Spec. W-P-115a as Type 1). (Panelboards - Class 1) (Loadcenters - Class 2).
 - 1. The panels shall have a hinged door with lock and typed directory.
 - 2. Terminal connectors shall be U.L. listed al/cu type.
 - 3. Panels shall be furnished with grounding terminal strip.
 - 4. Flush mounted panels shall have factory furnished trim.
 - 5. Panel boxes shall be code gauge, primed and painted manufacturer's standard finish.
 - 6. Panel boxes shall be of necessary height to accommodate breaker and spaces.
 - 7. Panel breakers shall be U.L. listed quick-make, quick-break, thermal magnetic type. Breakers shall have interrupting ratings of 22,000 A.I.R. Breakers shall be 1" or larger plug-in type unless specified.
 - 8. Furnish GFI and/or AFCI circuit breakers where indicated or required by code.
 - 9. All panelboards and circuit breakers must be capable of interrupting fault currents indicated on the panel schedule.
 - 10. Load centers and Panelboards shall be Square D types as shown on plans, Westinghouse, ITT, General Electric or equivalent.
- B. Small motor disconnects shall be Westinghouse type MS or B101 unless noted otherwise. Fused switches shall be general duty.
- C. Fuses shall be furnished for fused disconnect switches. Fuses shall be of required or specified voltage and current rating. Furnish Owner with one set of spare fuses for all types installed. Current limiting fuses must be installed when indicated.
- D. Disconnect switches shall be at least general duty, U.L. listed, horsepower rated for motors, and be provided in a NEMA 1 enclosure or NEMA 3 R as noted on plans.
- E. Panelboards shall be U.L. listed and shall be flush or surface mounted as indicated on the plans.

- F. Panels, cabinets, and boxes shall be code gauge.
- G. All boxes shall be U.L. listed for intended uses and shall comply with the NEC requirements.
- H. Concealed outlet boxes shall be listed PVC or code gauge galvanized or sheradized metal not less than #14 gauge and sized to the NEC requirements.
- I. Junction boxes shall be of code gauge steel cast or PVC and sized to NEC requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set all electrical panels or boxes plumb and square with building lines. Mount panelboards so top is not higher than 6'7" AFF.
- B. Where more than one wiring device is to be mounted, solid gang boxes shall be used.
- C. All wiring shall be done in accordance with the NEC requirements.
- D. All panels shall have typed directories.
- E. The Electrical Contractor shall balance all panels and shall comply with the local utility company requirements.
- F. All disconnects shall be labeled with the use indicated. The label shall be plastic tape with embossed letters.
- G. All breaker panels shall have a plastic nameplate or equal indicating panel name.

END OF SECTION 26 06 20

SECTION 26 21 00 - LOW VOLTAGE ELECTRIC SERVICE ENTRANCE

PART 1 - GENERAL

1.1 SCOPE

- A. The electrical services will be 120/240 volt, single phase, 3 wire grounded at the building. The secondary shall be run underground to the building.
- B. All work shall comply with the National Electrical Code (NEC) and local Utility Company regulations and requirements.
- C. The General Contractor shall provide trenching and backfill.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Conduit shall be galvanized rigid steel and Schedule 40 PVC per 26 05 33.
- B. The meter (s) will be by the local Utility Company.
- C. Meter trim and Cabinet will be by the Electrical Contractor. Meter trim shall be as shown on the plans.
- D. Ground rods per Section 26 05 26.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Electrical Contractor shall meet all the requirements of the local Utility Company and determine the extent of the utilities work.
- B. The Electrical Contractor shall install the meter trim.

END OF SECTION 26 21 00

SECTION 26 24 16 – PANELBOARDS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the furnishing, installation, and connection of panelboards.

1.2 SUBMITTALS

- A. Submit in accordance with Section 26 05 00, ELECTRICAL PROVISIONS equal to Square D.
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include electrical ratings, dimensions, mounting details, materials, wiring diagrams accessories and weights of equipment. Complete nameplate data including manufacturer's name and catalog number.
- C. Certification: Two weeks prior to final inspection, submit four copies of the following to the Engineer:
 - 1. Certification that the material is in accordance with the drawings and specifications has been properly installed, and that the loads are balanced.

PART 2 - PRODUCTS

2.1 PANELBOARDS

- A. Panelboards shall be in accordance with UL, NEMA, NEC, and as shown on the drawings and shall be fitted with arc fault and surge protection.
- B. Panelboards shall be standard manufactured products. All components of the panelboards shall be the product and assembly of the same manufacturer. All similar units of all panelboards to be of the same manufacturer.
- C. All panelboards shall be hinged "door in door" type with:
 - 1. Interior hinged door with hand operated latch or latches as required to provide access to circuit breaker operating handles only, not to energized ports.
 - 2. Outer hinged door shall be securely mounted to the panelboard box with factory bolts, screws, clips, or other fasteners requiring a tool for entry, hand operated latches are not acceptable.
 - 3. Push inner and outer doors shall open left to right.

- D. All panelboards shall be completely factory assembled with molded case circuit breakers. Include one-piece removable, inner dead front cover independent of the panelboard cover.
- E. Panelboards shall have main breaker or main lugs, bus size, voltage, phase, top or bottom feed, and flush or surface mounting as scheduled on the drawings.
- F. Panelboards shall conform to NEMA 3R:
 - 1. Nonreduced size copper or aluminum bus bars, complete with current ratings as shown on the panel schedules connection straps bolted together and rigidly supported on molded insulators.
 - 2. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type. Three-phase, four-wire busing shall be such that when any three adjacent single-pole breakers are individually connected to each of the three different phases, two-or three-pole breakers can be installed at any location. Current-carrying parts of the bus assembly shall be plated. Mains ratings shall be as shown.
 - 3. Mechanical lugs furnished with panelboards shall be cast, stamped, or machined metal alloys of sizes suitable for the conductors indicated to be connected thereto.
 - 4. Neutral bus shall be mounted on insulated supports.
 - 5. Grounding bus bar equipped with screws or lugs for the connection of grounding wires.
 - 6. Buses braced for the available short circuit current, but not less than 22,000 amperes symmetrical for 120/208 volt, and 14,000 amperes symmetrical for 277/480-volt panelboards.
 - 7. Branch circuit panels shall have buses fabricated for bolt-on type circuit breakers.
 - 8. Protective devices shall be designed so that they can be easily replaced.
 - 9. Where designated on panel schedule "spaces", include all necessary bussing, device support and connections. Provide blank cover for each space.
 - 10. In two section panelboards, the main bus in each section shall be full size. The first section shall be furnished with subfeed lugs on the line side of main lugs only, or through-feed lugs for main breaker type panels, and with cable connections to the second section. Panelboard sections with tapped bus or crossover bus are not acceptable.

2.2 CABINETS AND TRIMS

A. Cabinets:

- 1. Provide galvanized steel cabinets to house panelboards. Cabinets for outdoor panels shall be factory primed and suitably treated with a corrosion-resisting paint finish meeting UL 50 and UL 67.
- 2. Cabinet enclosure shall not have ventilating openings.
- 3. Cabinets for panelboards may be of one-piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.

2.3 MOLDED CASE CIRCUIT BREAKERS FOR PANELBOARDS

- A. Breakers shall be UL 489 listed and labeled, in accordance with the NEC, as shown on the drawings, and as specified.
- B. Circuit breakers in panelboards shall be bolt on type on phase bus bar or branch circuit bar.

1. Molded case circuit breakers for lighting and appliance branch circuit panelboards shall have minimum interrupting rating as indicated but not less than:
 - a. 120/208 Volt Panelboard: 22,000 amperes symmetrical.
 - b. 277/480 Volt Panelboard: 14,000 amperes symmetrical.
2. Molded case circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for 100-ampere frame or less. Magnetic trip shall be adjustable from 3X to 10X for breakers with 600 ampere frames and higher.

C. Breaker features shall be as follows:

1. A rugged, integral housing of molded insulating material.
2. Silver alloy contacts.
3. Arc quenchers and phase barriers for each pole.
4. Quick-make, quick-break, operating mechanisms.
5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
6. Electrically and mechanically trip free.
7. An operating handle which indicates ON, TRIPPED, and OFF positions.
 - a. Line connections shall be bolted.
 - b. Interrupting rating shall not be less than the maximum short circuit current available at the line terminals.
8. An overload on one pole of a multipole breaker shall automatically cause all the poles of the breaker to open.
9. Shunt trips shall be provided where indicated.

2.4 SEPARATELY ENCLOSED MOLDED CASE CIRCUIT BREAKERS

- A. Where separately enclosed molded case circuit breakers are shown on the drawings, provide circuit breakers in accordance with the applicable requirements of those specified for panelboards.
- B. Enclosures are to be of the NEMA types shown on the drawings. Where the types are not shown, they are to be the NEMA type most suitable for the environmental conditions where the breakers are being installed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the Manufacturer's instructions, the NEC, as shown on the drawings, and as specified.
- B. Locate panelboards so that the present and future conduits can be conveniently connected. Coordinate the sizes of cabinets with designated closet space.
- C. Install a typewritten schedule of circuits in each panelboard after being submitted to and approved by the Engineer. Schedules, after approval, shall be typed on the panel directory cards and installed in the appropriate panelboards, incorporating all applicable contract changes pertaining to that schedule.

- D. Mount the panelboard fully aligned and such that the maximum height of 78 inches.
- E. For panelboards located in areas accessible to the public, paint the exposed surfaces of the trims, doors, and boxes with finishes to match surrounding surfaces after the panelboards have been installed.
- F. Directory-card information shall be typewritten to indicate outlets, lights, devices, and equipment controlled and final room numbers served by each circuit and shall be mounted in holders behind protective covering.

END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Weather-resistant receptacles.
3. Snap switches and wall-box dimmers.
4. Wall-switch and exterior occupancy sensors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers are equal to:

1. Cooper Wiring Devices
2. Hubbell Incorporated
3. Leviton Mfg. Company Inc.

B. Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596, equal to commercial grade Leviton.

2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, feed-through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FSW-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
4. GFCI receptacles in damp and wet locations shall be rated weather resistant per NEC.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Available products or equal that may be incorporated into the work include the following:
 - a. Cooper; VGF20.
 - b. Hubbell; GFR5352L.
 - c. Leviton; 7590.

2.5 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Available products or equal that may be incorporated into the work include the following:
 - a. Single Pole:
 - 1) Cooper; AH1221.
 - 2) Hubbell; HBL1221.
 - 3) Leviton; 1221-2.
 - b. Two Pole:
 - 1) Cooper; AH1222.
 - 2) Hubbell; HBL1222.
 - 3) Leviton; 1222-2.
 - c. Three Way:
 - 1) Cooper; AH1223.
 - 2) Hubbell; HBL1223.
 - 3) Leviton; 1223-2.
 - d. Four Way:
 - 1) Cooper; AH1224.
 - 2) Hubbell; HBL1224.
 - 3) Leviton; 1224-2.

2.6 WALL-BOX DIMMERS

A. Dimmer Switches shall be modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.

B. Dimmers shall have a continuously adjustable slider; with single-pole or three-way switching. Comply with UL 1472.

- C. Fluorescent Lamp Dimmer Switches are to be modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.7 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 - 1. Plate-Securing Screws shall be metal with head color to match plate finish.
 - 2. Material for Finished Spaces shall be 0.035-inch- thick, Type 302 stainless steel.
 - 3. Material for Unfinished Spaces shall be galvanized steel.
 - 4. Material for Damp Locations shall be cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plate shall be NEMA 250, complying with Type 3R, weather-resistant, diecast aluminum with lockable cover.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail or replace all damaged conductors.
 - b. Straighten conductors that remain and remove corrosion and foreign matter.
 - c. Pigtail existing conductors is permitted, provided the outlet box is large enough.

5. Conceal all wiring.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
10. Provide sound gaskets in STC rate partitions

- E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

F. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

- G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates. Devices for adjacent rooms in STC partitions shall not share a common stud bay.

- H. Adjust locations of service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 FIELD QUALITY CONTROL

A. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.

2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

B. Wiring device will be considered defective if it does not pass tests and inspections.

END OF SECTION 26 27 26

SECTION 26 51 00 - INTERIOR LIGHTING - LED

PART 1 - GENERAL

1.1 SCOPE

- A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections.
- B. The complete lighting system will consist of indoor lighting, outdoor lighting with all necessary fixtures, switches, sensors, etc.
- C. All devices shall be U.L. listed and approved for the location and application. All wiring methods and materials shall comply with the National Electrical Code (NEC) requirement.
- D. The Electrical Contractor shall submit shop drawings of all light fixtures and lamps.

1.2 SUBMITTALS

- A. Product Data: Arrange in order of luminaire designation. The submittals shall include data on features, ratings, listings, certifications, accessories, finishes, dimensions, emergency components, photometric data, and luminaire efficiency data.
- B. Installation, Operation, and Maintenance Manuals.

1.3 QUALITY ASSURANCE

- A. Lighting fixtures shall be of specification grade and listed or labeled by Underwriters Laboratories (UL) or an approved Nationally Recognized Testing Laboratory (NRTL).
- B. LED fixtures shall comply with the following:
 - 1. UL Standard 8750 "Light Emitting Diode Equipment for Use in Lighting Products", IES Standard LM-79 "Electrical and Photometric Measurements of Solid-State Lighting Products", IES Standard LM-80 "Measuring Lumen Maintenance of LED Light Sources", and IES Standard TM-21 "Projecting Long Term Lumen Maintenance of LED Light Sources".
 - 2. ANSI C78.377 "Specifications for the Chromaticity of Solid State Lighting Products" with LEDs binned within a maximum three-step MacAdam Ellipse to ensure color consistency amongst luminaries of the same type.

1.4 WARRANTY

For fixtures, lamps, drivers, and components, provide a complete warranty for parts and labor for a minimum of five years from the date of Substantial Completion.

PART 2 – PRODUCTS

2.1 LIGHTING

- A. Provide lighting fixtures in accordance with the Fixture Schedule.
 - 1. Provide only LED fixtures with a U.S. Environmental Protection Agency (EPA) Energy Star label.
- B. Recessed lighting fixtures shall be thermally protected.
- C. LED fixtures shall be modular and allow for separate replacement of LED lamps and drivers. User serviceable LED lamps and drivers shall be replaceable from the room side.
- D. Dimmable LED fixtures shall have a 0-10 volt, 3-wire dimming driver.

2.2 LAMPS

- A. LED lamps shall have a color temperature of 4000 degrees K, a CRI of 80 minimum, and a lumen maintenance L70 rating of 50,000 hours minimum unless noted otherwise.
- B. Retrofit LED lamps shall comply with NEMA SSL 4 “SSL Retrofit Lamps: Suggested Minimum Performance Requirements”.

2.3 DRIVERS

- A. LED drivers shall be electronic-type, labeled as compliant with radio frequency interference (RFI) requirements of FCC Title 47 Part 15, and comply with NEMA SSL 1 “Electronic Drivers for LED Devices, Arrays, or Systems”. LED drivers shall have a sound rating of “A”, have a minimum efficiency of 85%, and be rated for a THD of less than 20 percent at all input voltages.
- B. Dimmable LED drivers shall be 0-10V type. Dimmable LED drivers shall be capable of dimming without LED strobing or flicker across their full dimming range.
- C. Drivers shall be rated for the ambient temperatures in which they are located. Outdoor fixtures shall be equipped with ballasts or drivers rated for reliable starting to -20 degrees F. Indoor fixtures located in areas with direct sunlight or above normal ambient temperatures shall have ballasts or drivers rated at 65 degrees C minimum.
- D. Drivers shall have their fuses accessible from outside of the fixture chassis.
- E. Induction lamp drivers shall be electronic and comply with radio frequency interference (RFI) requirements of FCC Title 47 Part 15 and be rated for a total harmonic distortion (THD) of less than 20 percent at all input voltages.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS

- A. Install fixtures level, with no gaps between adjacent fixtures or between fixtures and surrounding surfaces. Lenses, reflectors, and trims of fixtures shall be properly and uniformly aligned.
- B. Where fixtures are shown with dual switches, control all inner lamps with one switch and all outer lamps with the other switch. Where dimming or occupancy sensor-controlled fixtures are shown, control the fixtures in accordance with the appropriate wiring diagram or manufacturer's instructions.
- C. Connect night light fixtures and emergency lighting fixtures to the hot (unswitched) side of lighting circuits.
- D. Provide an individual feed with ground conductor from a junction box to each lighting fixture. Lighting fixtures shall not be daisy-chained.
- E. Drops to recessed fixtures may be flexible metallic conduit, or manufactured wiring systems may be used where accessible. Fixtures shall be provided with sufficient length to permit removal and lowering of the fixtures 12" below the ceiling.
- F. Provide green grounding conductors back to the panel ground for lighting circuits. Raceways shall not be used as grounding conductors.
- G. Fixtures shall have their exterior labels removed and shall be thoroughly cleaned. Burned out lamps shall be replaced.

3.2 FIELD QUALITY CONTROL

- A. A visual inspection shall be performed to verify cleanliness and alignment of the fixtures. Misalignment and light leaks shall be corrected, and rattles due to ventilation system vibration shall be eliminated.
- B. Perform an operational test to verify that all fixtures illuminate properly, dimming systems dim properly (i.e., no flicker), and lighting zones are switched according to the drawings.

END OF SECTION 26 51 00

SECTION 27 20 00 - DATA COMMUNICATIONS

PART 1 - GENERAL

1.1 SCOPE

- A. Computer wiring within the building shall be furnished and installed by the Electrical Contractor.
- B. The computer system shall include cable from the system server to the distribution center patch panel to the individual outlets indicated on the drawings. This work will be coordinated by the Electrical Contractor.
- C. All work shall comply with the cable manufacturer's recommendations and the National Electrical Code (NEC).
- D. Cable within the building to the various computer locations shall be concealed above the ceiling and in the cavity walls.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plywood panelboard shall be 3/4" plywood painted gray and mounted to receive computer equipment and located as shown on the plans.
- B. Conduit and outlet boxes shall be per Section 26 05 33.
- C. Modular Jack -Leviton Quick Port – 61110 Series 8 conductor, Duplex TIA/EIA-568-B wiring patterns and Category 6 Certification.
- D. Computer Wire -23 AWG 8 Conductor unshielded twisted pair (UTP) – blue Category 6 four pair which complies with TIA/EIA 568B standards.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Conduits shall be furnished and installed by the Electrical Contractor where indicated.
- B. The Contractor shall verify all wiring with the Engineer before proceeding.
- C. See notes and plans for installation instructions. Comply with cable manufacturer installation requirements.

- D. Minimum burial depth for direct burial computer cable shall be 30" and minimum separation shall be 12" between computer and power conductors.

END OF SECTION 27 20 00

SECTION 27 30 00 - VOICE COMMUNICATIONS

PART 1 – GENERAL

1.1 SCOPE

- A. Telephone wiring within the building shall be furnished and installed by the Electrical Contractor.
- B. The telephone system shall include cable from the utility pole to the building furnished and installed by the Telephone Company. If required conduit from the pole and into the building will be by the Electrical Contractor. This work will be coordinated by the Electrical Contractor.
- C. All work shall comply with telephone company regulations and the National Electrical Code (NEC).
- D. Cable within the building to the various phone locations shall be concealed above the ceiling and in the cavity walls.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plywood panelboard shall be 3/4" plywood painted gray and mounted to receive telephone equipment and located as shown on the plans.
- B. Size conduit based on Telephone Company recommendations. Conduits underground or in concrete shall be rigid steel or schedule 40 PVC.
- C. Modular Jack - Leviton Quick Port – 61110-Rx6 Series 8 conductor or equivalent, Simplex with TIA/EIA-568-B wiring patterns and Category 6 Certification.
- D. Phone Wire - 24 AWG 8 Conductor unshielded twisted pair (UTP) – green Category 5E four pair which complies to EIA/TIA 568A standards.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Conduits shall be furnished and installed by the Electrical Contractor where indicated. All exterior wiring shall be furnished and installed by the Telephone Company.
- B. The Contractor shall verify all wiring with Telephone Company Engineer before proceeding.

- C. See notes and plans for instructions for telephone entrance. Comply with Telephone Company requirements.
- D. Minimum burial depth for direct burial telephone cable shall be 30" and minimum separation shall be 12" between telephone and power conductors.

END OF SECTION 27 30 00

SECTION 27 40 00 - CABLE TELEVISION SYSTEM AUDIO –VIDEO COMMUNICATIONS

PART 1 - GENERAL

1.1 SCOPE

- A. The buildings will have a Cable TV system consisting of wiring and outlets.
- B. All wiring and grounding shall comply with applicable Codes. All equipment shall be U.L. listed where listing is available.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Install wall outlets in area shown on the drawings.
- B. Install blank cover plates on all outlets.

PART 3 - EXECUTION

3.1 INSTALLATION OF SYSTEM

Electrical Contractor shall arrange and pay for any cost involved and coordinate installation with the local Cable Television Company.

END OF SECTION 27 40 00