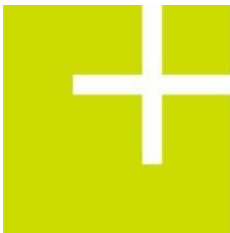




PROJECT MANUAL
1031 Annunciation
EDR Project #23083
Pricing & Permit Set
21 February 2025



EskewDumezRipple+

SECTION 00 01 03
PROJECT DIRECTORY

PART 1 GENERAL

1.01 PROJECT DIRECTORY

- A. Owner: Butler Holding Company, LLC.
 - 1. Address: 5701 Magazine St.
 - 2. City, State, Zip: New Orleans, Louisiana 70115.
- B. Owner's Construction Consultant: Gilbert, Kelly & Couturie.
 - 1. Address: 2211 N. Causeway Blvd., Suite 121.
 - 2. City, State, Zip: Metairie, LA 70001.
 - 3. Phone: (504) 836-2121.
 - 4. Contact: James Brown, Owner's Construction Representative
 - 5. E-mail: james@gscla.com.
- C. Architect: Eskew+Dumez+Ripple.
 - 1. Address: 365 Canal Street, Suite 3150.
 - 2. City, State, Zip: New Orleans, LA 70130.
 - 3. Phone: (504) 561-8686.
 - 4. Contacts:
 - a. Mark Hash, Project Manager
 - 1) E-mail: mhash@eskewdumezripple.com
 - b. Zach Chance, Project Architect
 - 1) zchance@eskewdumezripple.com
- D. Structural/Civil Engineer: AP Design Group
 - 1. Address: 3616 Henican Plac
 - 2. City, State, Zip: Metairie, LA 70001
 - 3. Phone: (504) 410-5322
 - 4. Contact: Josh Juneau, Project Manager

5. E-mail: jjuneau@ap-eng.com

E. Mechanical/Electrical Engineer: Parish Engineering

1. Address: 7000 Innovation Park Drive
2. City, State, Zip: Baton Rouge, LA 70820.
3. Phone: (225) 332-0222.
4. Contacts:

a. Grant McIntyre, Project Manager

1) E-mail: gmcintyre@parisheng.com

F. Landscape Architect: Carbo

1. Address: 6633 Government Street
2. City, State, Zip: Baton Rouge, LA 70806.
3. Phone: (225) 302-7452.
4. Contact: Zach Broussard, Project Manager
5. Email: zbroussard.carbo-LA.com.

G. Surveyor: Gilbert, Kelly & Couturie.

1. Address: 2121 N. Causeway Blvd..
2. City, State, Zip: Metairie, Louisiana 70001.
3. Phone: (504) 836-2121.
4. Contact: James Brown, Surveyor.

H. Geotechnical: Eustis Engineering.

1. Address: 3011 28th Street.
2. City, State, Zip: Metairie, Louisiana 70002.
3. Phone: (504) 834-0157.
4. Contact: Benjamin Cody, Engineer of Record.

EDR Project No. 23083

21 February 2025

1031 Annunciation
Permit and Pricing Set

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00 01 03

SECTION 00 01 07
SEALS PAGE

This Seals/Stamp Page responds to the requirements of Louisiana Title 46, Professional Occupational Standards, Part 1, Architects Chapter 11. Administration, Rule 1105 B.

The following specification sections of the Project Manual have been assembled by ESKEWDUMEZRIPPLE+ and were prepared by me or under my responsible supervision.

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The following specification sections of the Project Manual have been assembled by AP DESIGN GROUP and were prepared by me or under my responsible supervision.

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The following specification sections of the Project Manual have been assembled by CARBO and were prepared by me or under my responsible supervision.

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SECTION 00 41 00
BID FORM

THE PROJECT AND THE PARTIES

1.01 TO:

A. Butler Holding Company, LLC (Owner)

5701 Magazine St

New Orleans, Louisiana 70115

1.02 FOR:

A. Project: 1031 Annunciation

B. Architect's Project Number: 23083

1031 Annunciation St

New Orleans, Louisiana 70130

1.03 DATE: _____ (BIDDER TO ENTER DATE)

1.04 SUBMITTED BY: (BIDDER TO ENTER NAME AND ADDRESS)

A. Bidder's Full Name _____

1. Address _____

2. City, State, Zip _____

1.05 OFFER

A. Having examined the Place of The Work and all matters referred to in the Bid Documents prepared by EskewDumezRipple+ for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of:

B. _____ dollars
(\$ _____), in lawful money of the United States of America.

C. We have included the required security deposit as required by the the Contract.

D. All applicable federal taxes are included and State of Louisiana taxes are included in the Bid Sum.

1.06 ACCEPTANCE

- A. This offer shall be open to acceptance and is irrevocable for thirty days from the bid closing date.
- B. If this bid is accepted by Owner within the time period stated above, we will:
 - 1. Execute the Agreement within seven days of receipt of Notice of Award.
 - 2. Furnish the required bonds within seven days of receipt of Notice of Award.
 - 3. Commence work within seven days after written Notice to Proceed of this bid.
- C. If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to Owner by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this bid and the bid upon which a Contract is signed.
- D. In the event our bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

1.07 CONTRACT TIME

- A. If this Bid is accepted, we will:
- B. Complete the Work in 12 calendar months from Notice to Proceed.

1.08 BID FORM SUPPLEMENTS

- A. The following Supplements are attached to this Bid Form and are considered an integral part of this Bid Form:
 - 1. Document 00 43 22 - Unit Prices Form: Include a listing of unit prices specifically requested by Contract Documents.
- B. We agree to submit the following Supplements to Bid Forms within 24 hours after submission of this bid for additional bid information:
 - 1. Document 00 43 22 - Unit Prices Form: Include a listing of unit prices specifically requested by Contract Documents.

1.09 BID FORM SIGNATURE(S)

- A. The Corporate Seal of
- B. (Bidder - print the full name of your firm)
- C. was hereunto affixed in the presence of:

D. _____

E. (Authorized signing officer, Title)

F. (Seal)

G. _____

H. (Authorized signing officer, Title)

END OF SECTION 00 41 00

SECTION 00 43 22
UNIT PRICES FORM

PARTICULARS

1.01 THE FOLLOWING IS THE LIST OF UNIT PRICES REFERENCED IN THE BID SUBMITTED BY:

1.02 (BIDDER) _____

1.03 TO (OWNER): _____

1.04 DATED _____ AND WHICH IS AN INTEGRAL PART OF THE BID FORM.

1.05 THE FOLLOWING ARE UNIT PRICES FOR SPECIFIC PORTIONS OF THE WORK AS LISTED, AND ARE APPLICABLE TO AUTHORIZED VARIATIONS FROM THE CONTRACT DOCUMENTS.

UNIT PRICE LIST

2.01 ITEM DESCRIPTION UNIT QUANTITY UNIT VALUE

2.02 _____

2.03 _____

2.04 _____

2.05 _____

END OF SECTION 00 43 22

SECTION 00 52 00
AGREEMENT FORM

PART 1 GENERAL

1.01 FORM OF AGREEMENT

- A. The Agreement to be executed is attached following this page.

1.02 RELATED REQUIREMENTS

- A. Section 00 72 00 - General Conditions.
- B. Section 00 73 00 - Supplementary Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00 52 00

SECTION 00 60 00
PROJECT FORMS

PART 1 GENERAL

1.01 FORM OF AGREEMENT AND GENERAL CONDITIONS

- A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:
 - 1. AIA Document A133, "Standard Form of Agreement between Owner and Contractor, Construction Manager as Constructor, Guaranteed Maximum Price."
 - a. The General Conditions for Project are AIA Document A201, "General Conditions of the Contract for Construction."
 - 2. The General Conditions are included in the Project Manual.
 - 3. The Supplementary Conditions for Project are separately prepared and included in the Project Manual.

1.02 ADMINISTRATIVE FORMS

- A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements.
- B. Copies of AIA standard forms may be obtained from the American Institute of Architects; <http://www.aia.org/contractdocs/purchase/index.htm>; docspurchases@aia.org; (800) 942-7732.
- C. Preconstruction Forms:
 - 1. Form of Performance Bond and Labor and Material Bond: AIA Document A312, "Performance Bond and Payment Bond."
- D. Information and Modification Forms:
 - 1. Form of Request for Proposal: AIA Document G709, "Proposal Request."
 - 2. Change Order Form: AIA Document G701, "Change Order."
 - 3. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G707, "Architect's Supplemental Instructions."
 - 4. Form of Change Directive: AIA Document G714, "Construction Change Directive."
- E. Payment Forms:
 - 1. Schedule of Values Form: AIA Document G703, "Continuation Sheet."

2. Payment Application: AIA Document G702/703, "Application and Certificate for Payment and Continuation Sheet."
3. Form of Contractor's Affidavit: AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
4. Form of Affidavit of Release of Liens: AIA Document G706A, "Contractor's Affidavit of Payment of Release of Liens."
5. Form of Consent of Surety: AIA Document G707, "Consent of Surety to Final Payment."

END OF SECTION 00 60 00

SECTION 00 72 00
GENERAL CONDITIONS

PART 1 GENERAL

1.01 FORM OF GENERAL CONDITIONS

- A. The General Conditions applicable to this contract is attached following this page.

1.02 RELATED REQUIREMENTS

- A. SECTION 00 73 00 - Supplementary Conditions.

1.03 SUPPLEMENTARY CONDITIONS

- A. Refer to Document 00 73 00 for amendments to these General Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 00 72 00

SECTION 00 73 00
SUPPLEMENTARY CONDITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. These Supplementary Conditions amend and supplement the General Conditions defined in Document 00 72 00 - General Conditions and other provisions of Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.
- B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

1.02 RELATED SECTIONS

- A. Section 00 60 00 - PROJECT FORMS.
- B. Section 00 72 00 - General Conditions.

1.03 MODIFICATIONS TO GENERAL CONDITIONS

- A. Refer to attached Document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

The following supplements modify AIA Document A201 – 2017, General Conditions of the Contract for Construction. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 1 GENERAL PROVISIONS

1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

Add the following to Section **1.2.:**

1.2.4 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to and govern the execution of the work of all Sections of the Specifications.

ARTICLE 2 OWNER

2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

Delete Section **2.3.6** and substitute the following:

2.3.6 The Contractor shall be responsible for securing and shall pay for copies of Contract Documents to use for execution of the Construction Contract.

ARTICLE 3 CONTRACTOR

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

Add the following to Section **3.2.1.:**

3.2.1.1 The Contractor is to accept the area of the Work in its present condition and therefore shall carefully examine the area of the work and determine for himself all existing conditions visually discernable and/or reasonably expected from his understanding of the Contract Documents and/or reasonably inferable from the Contract Documents or his particular knowledge of this particular type of project, and he shall be responsible for same.

Add the following to Section **3.2.:**

3.2.5 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for evaluating and responding to the Contractor's requests for information that are not prepared in accordance with the Contract Documents or where the requested information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

3.4 LABOR AND MATERIALS

Add the following to Section **3.4.2.**:

3.4.2.1 *After the Contract has been executed, the Owner and Architect will consider requests for the substitutions of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications). By making requests for substitutions, the Contractor:*

- .1 represents that it has personally invested the proposed substitute product and determined that it is equal or superior in all respects to that specified;*
- .2 represents that it will provide the same warranty for the substitution as it would have provided for the product specified;*
- .3 certifies that the cost data presented is complete and includes all related costs for the substituted product and for Work that must be changed as a result of the substitution, except for the Architect's redesign costs and waives all claims for additional costs related to the substitution that subsequently become apparent; and*
- .4 shall coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.*

3.4.2.2 *The Owner shall be entitled to reimbursement from the Contractor for amounts paid to the Architect for reviewing the Contractor's proposed substitutions and making agreed-upon changes in the Drawings and Specifications resulting from such substitutions.*

ARTICLE 7 CHANGES IN THE WORK

7.1 GENERAL

Add the following to Section **7.1.**:

7.1.4 *The allowance for the combined overhead and profit included in the total cost to the Owner shall be based on the following schedule:*

- .1 For the Contractor, for Work performed by the Contractor's own forces, 10 percent of the cost.*
- .2 For the Contractor, for Work performed by the Contractor's Subcontractors, 5 percent of the amount due the Subcontractor.*
- .3 For each Subcontractor involved, for Work performed by that Subcontractor's own forces, 5 percent of the cost.*
- .4 For each Subcontractor involved, for Work performed by the Subcontractor's Sub-subcontractors, 5 percent of the amount due the Sub-subcontractor.*
- .5 Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.4.*
- .6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and Subcontracts. Labor and materials shall be itemized in the manner prescribed above.*

7.3 CONSTRUCTION CHANGE DIRECTIVES

In the first sentence of Section **7.3.4**, delete the words "a reasonable amount" and substitute: "*an amount based on overhead and profit percentages indicated in Section 7.1.4.*"

ARTICLE 9 PAYMENTS AND COMPLETION

9.3 APPLICATIONS FOR PAYMENT

Add the following to Section **9.3.1.**:

9.3.1.3 Until Substantial Completion, the Owner shall pay 95 percent of the amount due the Contractor on account of progress payments.

9.8 SUBSTANTIAL COMPLETION

Add the following sentence to Section **9.8.5.**: “*The payment shall be sufficient to increase the total payment to 95 percent of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work and unsettled claims.*”

9.10 FINAL COMPLETION AND PAYMENT

Add the following to Section **9.10.2.**:

9.10.2.1 Contractor shall submit a 45-day clear Lien Certificate from the Clerk of Court.

Insert new Section as follows:

9.11 LIQUIDATED DAMAGES

9.11.1 The Contractor and the Contractor's surety, if any, shall be liable for and shall pay the Owner the sums hereinafter stipulated as liquidated damages, and not a penalty, for each calendar day of delay after the date established for Substantial Completion in the Contract Documents until the Work is substantially complete: One Thousand Dollars (\$1000.00).

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

12.2.2 AFTER SUBSTANTIAL COMPLETION

Add the following to Section **12.2.2.**:

12.2.2.4 Upon request by the Owner and prior to the expiration of one year from the date of Substantial Completion, the Architect will conduct, and the Contractor shall attend, a meeting with the Owner to review the facility operations and performance.

Add the following to Section **12.2.**:

12.2.6 The corrective remedies set forth in this Section 12.2 are not exclusive and shall not deprive the Owner of any action right or remedy otherwise available to it for breach of any of the provisions of the Contract Documents and for any damages suffered by Owner as a result of such defects in the Work.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

Delete Section **14.1.1.4.**

Delete the following from Section **14.1.3.:** “as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.”

Delete Section **14.1.4.**

14.2 TERMINATION BY THE OWNER FOR CAUSE

Add the following to Section **14.2.1.:**

- .5 Failure to complete the punch list within the lien period as provided in 9.10.2.*

Add the following to Section **14.2.:**

14.2.5 If an agreed sum of liquidated damages has been established, termination by the Owner under this Article will not relieve the Contractor and/or surety of his obligation under the liquidated damages provisions and the Contractor and/or surety shall be liable to the Owner for per diem liquidated damages.

Delete **14.4** and replace with the following:

14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

14.4.1 The Owner may, at any time, terminate the Contract in whole or in part for the Owner's convenience and without cause. Termination by the Owner under this Section 14.4 shall be by a notice of termination delivered to the Contractor, specifying the extent of termination and the effective date.

14.4.2 Upon receipt of a notice of termination, the Contractor shall immediately, in accordance with instructions from the Owner, proceed with performance of the following duties regardless of delay in determining or adjusting amounts due under the Section 14.4:

- .1 cease operations as specified in the notice;*
- .2 place no further orders and enter into no further subcontracts for materials, labor, services or facilities, except as necessary to complete portions of the Contract not terminated;*
- .3 terminate all subcontracts and orders to the extent they relate to the Work terminated;*
- .4 proceed to complete the performance of Work not terminated; and*
- .5 take action that may be necessary or that the Owner may direct for the protection and preservation of the terminated work.*

14.4.3 The amount to be paid to the Contractor by the Owner because of the termination shall consist of:

- .1 amounts due for Work performed and for Work in process on or off the site to the extent completed on the terminated portion of the Contract before the effective date, the cost of that Work and the expense of settling and paying termination costs under the terminated subcontracts and purchase orders that are properly chargeable to the terminated portion of the Contract;*

- .2 the reasonable costs of settlement of the Work terminated, including accounting, legal, clerical and other expenses reasonable necessary for the preparation of termination settlement proposals and supporting data; additional costs of termination and cancellation charges and settlement of subcontracts not already allowed under Section 14.4.3.1; and storage, transportation and other costs incurred which are reasonable necessary for the preservation, protection or disposition of the terminated Work; and
- .3 a fair and reasonable profit of the Work actually completed as of the date of termination, but in no event will any anticipated profits be paid.

14.4.4 Allowance shall be made for previous payments to the Contractor for the terminated portion of the Work, and Claims settled or pending under ARTICLE 4 between the Owner and Contractor, and for the value of materials, supplies, equipment and other items that are part of the cost of the Work to be disposed of by the Contractor.

14.4.5 The term "cost" as used in this Section 14.4 shall be as listed in Section 7.3.4.

14.4.6 If Contractor is terminated by the Owner for cause pursuant to Section 14.2, and it is later determined that such termination was not justified, the termination will be converted into a termination for convenience for all purposes."

ARTICLE 15 CLAIMS AND DISPUTES

15.1 CLAIMS

Add the following to **15.1.6.2.**:

"The following are considered reasonably anticipated days of adverse weather on a monthly basis:

January	<u>11</u> days	May	<u>5</u> days	September	<u>4</u> days
February	<u>10</u> days	June	<u>6</u> days	October	<u>3</u> days
March	<u>8</u> days	July	<u>6</u> days	November	<u>5</u> days
April	<u>7</u> days	August	<u>5</u> days	December	<u>8</u> days

The Contractor shall ask for total adverse weather days. The Contractor's request shall be considered only for days over the allowable number of days stated above.

Note: Contract is on a calendar day basis".

Add the following to Section **15.1.6.**:

15.1.6.3 Claims for increase in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work and the number of day's increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require, including, where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the Claim.

15.1.6.4 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor.

Add the following sentence to Section **15.1.7.**: *If, before expiration of 30 days from the date of execution for this Agreement, the Owner obtains by separate agreement and furnishes to the Contractor a similar mutual waiver of all claims from the Architect against the Contractor for consequential damages which the Architect may incur as a result of any act or omission of the Owner or Contractor, then the waiver of consequential damages by the Owner and Contractor contained in this Section 15.1.6 shall be applicable to claims by the Contractor against the Architect.*

END OF DOCUMENT

SECTION 01 10 00
SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: 1031 Annunciation
- B. Owner's Name: Butler Holding Company, LLC.
- C. Architect's Name: Eskew+Dumez+Ripple, APC.
- D. The Project consists of construction to of a two story hotel..

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on the Cost of the Work plus a fee as described in Document 00 60 00 - PROJECT FORMS.

1.03 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of demolition and removal work is shown on drawings and specified in Section 02 41 00.
- B. Scope of alterations work is indicated on drawings.
- C. Plumbing: Alter existing and add new construction.
- D. HVAC: Alter existing and add new construction.
- E. Electrical Power and Lighting: Alter existing and add new construction.
- F. Fire Suppression Sprinklers: Alter existing and add new construction.
- G. Fire Alarm: Alter existing and add new construction.
- H. Contractor is required to remove and store the following prior to start of work, for later reinstallation by Contractor:
 - 1. Face brick on existing historic building.
 - 2. Existing steel windows.

1.04 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.05 OWNER OCCUPANCY

- A. Owner intends to occupy the Project upon Substantial Completion.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
 - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
- B. Arrange use of site and premises to allow:
 - 1. Work by Others.
 - 2. Work by Owner.
- C. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Time Restrictions:
 - 1. Limit Work to normal business working hours of 7:30 a.m. to 6:30 p.m., Monday through Friday, or as required by City ordinances.
 - a. Weekend Hours: Same as weekday with 72-hr prior Owner approval.
 - b. Early Morning Hours: With 72-hr prior Owner approval.
 - c. Holidays recognized by the City or the State: With 72-hr prior Owner approval.
- E. Utility Outages and Shutdown:
 - 1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 72-hr notice to Owner and authorities having jurisdiction.
 - 2. Prevent accidental disruption of utility services to other facilities.

1.07 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Owner.

1.08 ADDITIONAL ESTIMATING SERVICES AND SCHEDULE OF VALUE

- A. As a contractual requirement of this project, Contractors, Sub-Contractors, and Suppliers shall provide additional estimating services in a timely manner and a detailed Schedule of Values breakdown of the Contract sum as needed to assist the Owner in conforming with project funding requirements.
 - 1. This may include, but shall not be limited to, the following:
 - a. Highly detailed breakdowns of construction values, which may separate similar scope items into multiple line items.
 - b. Estimating alternative scenarios in order to document costs of demolition and replacement relative to repairs of similar items.
 - c. Estimating the costs of alternative material and methods.
 - d. Any other project funding requirements.
 - 2. The Contractor shall be required to meet with the Owner, Design Team, and Agencies, as deemed necessary by the Owner, to reconcile estimates and to assist in the alignment of project costs with funding resources.

1.09 SPECIFICATION FORMAT AND CONVENTIONS

- A. The Specifications are organized into Divisions and Sections using the CSI's "MasterFormat 2016 Edition" numbering system.
- B. Sections in Division 01 govern the execution of the Work of all Sections in the Project Manual.
- C. The use of "Related Requirements" is an aid to draw attention to other specification sections dealing with Work directly related to respective Section and does not, in any way, relieve the Contractor's responsibility for coordination of the Work.
- D. Specification section references noted on Drawings by (Section) numbers enclosed in parentheses, i.e. (09 91 23) are an aid to the Contractor in locating the material noted on respective Drawing(s) and do not, in any way, relieve the Contractor of the responsibility for furnishing a material that may be specified in another, unreferenced Section. Section references are not intended to direct specific trades to perform specific Work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 10 00

SECTION 01 21 00
ALLOWANCES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.

1.02 RELATED REQUIREMENTS

- A. Section 01 29 00 - PAYMENT PROCEDURES: Additional payment and modification procedures.

1.03 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final installation of systems described by an allowance must be completed to avoid delaying the Work.
- B. At the Architect's request, obtain proposals for each allowance. Include recommendations that are relevant to performing the Work.

1.04 ACTION SUBMITTALS

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

1.05 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentations to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.06 COORDINATION

- A. Coordinate allowance items with other portions of the Work.

1.07 LUMP SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to materials under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under and allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.08 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher or lower priced materials or systems of the same scope and nature as originally indicated.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine materials covered by an allowance promptly on delivery for damage or defects. Return damaged or defective materials to manufacturer for replacement.

3.02 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION 01 21 00

SECTION 01 29 00
PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

- A. Section 00 60 00 - PROJECT FORMS: Forms to be used.

1.03 SCHEDULE OF VALUES

- A. Form to be used: AIA Document G703.
 - 1. Arrange the Schedule of Values consistent with the AIA G703 form. At a minimum, line items should follow the project specifications with a brief description of the Work. Provide further itemization as required by the Architect and Owner. Additionally, separate line items for the following shall be indicated:
 - a. Each allowance, as applies,
 - b. Each alternate, as applies,
 - c. Closeout documentation, which includes record documents, operation and maintenance submittals, warranties, and assembly of extra materials.
- B. Forms filled out by hand will not be accepted.
- C. Submit Schedule of Values at earliest possible date but no later than the date of the Preconstruction Meeting.
- D. Include within each line item, a direct proportional amount of Contractor's overhead and profit.
- E. No revision to the schedule may be made after the schedule has been approved by the Architect and Owner, except to add approved Change Orders to subsequent Applications for Payment.
- F. Correlate line items in the Schedule of Values with other administrative forms and activities:
 - 1. Submittal Schedule

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
 - 1. Submit proposed form for approval with initial submittal of Schedule of Values.
- C. Forms filled out by hand will not be accepted.
- D. For each item, provide a column for listing each of the following:
 - 1. Description of work.
 - 2. Scheduled Values.
 - 3. Previous Applications.
 - 4. Work in Place and Stored Materials under this Application.
 - 5. Authorized Change Orders.
 - 6. Total Completed and Stored to Date of Application.
 - 7. Percentage of Completion.
 - 8. Balance to Finish.
 - 9. Retainage.
- E. Notarize and execute certification by signature of authorized officer.
- F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- G. Submit three originals (3) and three (3) copies of each Application for Payment, unless otherwise agreed upon at the Preconstruction meeting.
- H. Include the following with the application:
 - 1. Transmittal letter as specified for Submittals in Section 01 33 00.
 - 2. Construction progress schedule, revised and current as specified in Section 01 32 00.
 - 3. Partial release of liens from major Subcontractors and suppliers.
 - 4. Affidavits attesting to off-site stored products, as required by the Owner when permitted by the Owner.

- I. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.
- J. Initial Application for Payment: Before the Architect will review or process and the Owner will accept the first (initial) Application for Payment, the following shall be submitted, approved, and agreed upon by the Architect and Owner:
 - 1. Schedule of Values,
 - 2. Submittal Schedule,
 - 3. Insurance and Bond Certificates (as applies),
 - 4. Preliminary Construction Schedule, both electronic and in the construction schedule software's native file format(s),
 - 5. Contractor's key personnel names and contact information,
 - 6. List of subcontractors and their assignments,
 - 7. Copy of the building permit,
 - 8. Copy of the receipt for filing the construction contract with the authority having jurisdiction,
- K. Additionally, the Contractor shall submit the following before the Architect will review or process and the Owner will accept the first (initial) Application for Payment. Failure of the Contractor to submit the following information shall prohibit the Contractor from claiming these items as costs on any change order issued on the project:
 - 1. Contractor and subcontractors' labor burden for management, administrative, and construction labor. Labor burden shall be itemized to include applicable payroll taxes, worker's compensation insurance, unemployment compensation, and social security taxes.
 - 2. Contractor's fixed jobsite overhead cost per calendar day itemized with documentation to support daily rates.
 - 3. Contractor's bond premium rate with supporting information from the Contractor's carrier (as applies).
 - 4. Contractor's internal unit rate for company owned tools and equipment.

1.05 MODIFICATION PROCEDURES

- A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.
 - 1. Form to be used: AIA Document G710 "Architect's Supplemental Instructions."

- B. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within fourteen (14) calendar days of issuance of the document unless otherwise indicated in the document. The Contractor's submitted price shall be guaranteed for forty-five (45) calendar days.
 - 1. Form to be used: AIA Document G709 "Proposal Request."
- C. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors.
- D. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract and as indicated in "Request for Change".
- E. For authorized changes to the Work when time and/or cost of the Work has not been determined, Architect may issue a document that includes a complete description of the change in the Work and method for change in Contract Sum or Contract Time.
 - 1. Form to be used: AIA Document G714 "Construction Change Directive."
- F. Request for Change:
 - 1. A Request for Change shall originate from the Contractor and shall be submitted to the Architect. Descriptions below of Cost of the Work, Overhead and Profit, and Substantiation of Requests for Change are applicable to the Contractor, Subcontractors, Suppliers, and any lower tier Sub-Subcontractor and Supplier. See "Applications for Progress Payments" for additional requirements.
 - 2. Cost of the Work: Cost of the Work is defined to include the following: material, direct labor (labor to handle and install material, to program systems, and operate equipment), temporary structures, equipment and fuel, taxes, labor burden (applicable to direct labor only), insurance, shipping, handling, additional warranty costs, clean-up, engineering services, mobilization, and demobilization. Cost of the Work does not include items included in "Overhead and Profit" indicated below. Any item of the Cost of the Work may not be submitted as a percentage basis of another item.

3. Overhead and Profit: Overhead and Profit is defined to include the following: jobsite offices, temporary site utilities, storage containers and rental, small tools, safety equipment, cups, ice, and water, maintenance of roads, fencing, and stormwater management, project executive management, project management, field management (superintendent staff and field supervision), quality control management, safety management, and administrative staff, associated management, field, and staff labor burdens, postage and document transmission, document reproduction, estimating costs, scheduling costs, shop drawing revisions, maintenance of record documents, home office overhead including management and staff costs.
4. Overhead and Profit shall not be calculated on the Contractor's bond cost (as applies).
5. Overhead and Profit for the Contractor and Subcontractors each shall not exceed ten percent (10%) unless otherwise indicated.
6. Substantiation of Requests for Change: Each Request for Change is required to be substantiated as indicated below. Requests for Change that do not include itemized documentation outlined below will be returned to the Contractor for revision. Requests for Change shall be itemized as follows, as applies:
 - a. Quantities and unit costs for all material,
 - b. Quantities and rates for labor (without burden),
 - c. Quotes for rental equipment,
 - d. Quotes for mechanical and electrical equipment,
 - e. Quotes for temporary structures,
 - f. Clean-up,
 - g. Insurance,
 - h. Bonds,
 - i. Engineering services,
 - j. Labor burden,
 - k. Shipping and handling,
 - l. Tax,
 - m. Overhead and profit,
 - n. Any other items as requested by the Architect or Owner to substantiate costs.
7. Extension of Time: Requests for Change that include requests for extension of the contract time shall be submitted to include the following:

- a. A written narrative of the change to the critical path of the project schedule,
 - b. A current project schedule, in PDF form and in the construction scheduling software's native file format(s),
 - c. Previous project schedules, in PDF form and in the construction scheduling software's native file format(s).
- 8. Credit for deletions from Contract are similarly documented.
- 9. The Contractor shall be due extended fixed job site overhead for time delays only when complete stoppage of Work occurs causing a contract completion extension, and the Contractor is unable to mitigate financial damages through replacement Work. The stoppage must be due to acts or omissions solely attributable to the Owner. In all cases the Contractor is to notify the Architect in writing. Verifiable proof must be provided to the Architect that alternate work could not be performed and that the work stoppage directly delayed the Contractor's completion within the stipulated Contract Time.
- G. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
 - 1. Form to be used: AIA Document G701 "Change Order."
- H. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
 - 1. After a Change Order has been executed, no future requests for extensions of time, additional cost, or additional cost related to extension of time shall be considered for that Change Order.
- I. Any reservation of rights, stipulation, or other modification made on the Change Order by the Contractor, written or typed, will have no effect.
- J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- K. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION

- A. After issuing the Certificate of Substantial Completion, prepare an Application for Payment, as specified for progress payments, showing 100 percent completion for portion of the Work claimed as substantially complete less any amount withheld for completion of deficient or incomplete items identified on the Certificate of Substantial Completion.

1.07 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
 - 1. All closeout procedures specified in Section 01 77 00.
 - 2. Submittal of AIA Document G707 "Consent of Surety to Final Payment".
 - 3. Evidence that claims have been settled.
 - 4. 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.
 - 5. Final liquidated damages settlement statement.

PART 2 PRODUCTS - (NOT USED)

PART 3 EXECUTION - NOT USED

END OF SECTION 01 29 00

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes administrative and procedural requirements for management and coordination of the project, including the following:
 - 1. Electronic document submittal service.
 - 2. Preconstruction meeting.
 - 3. Progress meetings.
 - 4. Preinstallation meetings.
 - 5. Pre-closeout meeting.
 - 6. Coordination and Coordination Drawings.
 - 7. Requests for Interpretation (RFIs).
- B. Related sections include the following:
 - 1. Section 01 33 00 - SUBMITTAL PROCEDURES: Submitting coordination drawings.

1.02 DEFINITIONS

- A. RFI: Request for Interpretation. Request from Owner, Architect, or Contractor seeking information or clarifications of the Contract Documents.
- B. Coordination Drawings: Electronically produced drawings that overlay multiple scopes of project-specific work on one drawing sheet, to scale, for the purpose of coordinating the installation of scopes using horizontal and vertical controls.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.

1. The service will be used to transmit information electronically among the project team. The service, at minimum, is required to be able to process submittals, closeout documents, requests for information (RFIs), Architect's Supplemental Instructions (ASIs), Proposal Requests (PRs), revised drawings, change proposal requests, change orders, construction change directives, quality control logs, punch lists, Contractor's daily reports, testing reports, meeting minutes, and field reports.
2. Where individual specification sections indicate to provide multiple paper (bond) copies of documents, instead provide an electronic or digital file using the electronic submittal service.
3. Where individual specification sections indicate to provide a transmittal form, provide the form electronically.
4. Contractor, Architect, and Owner are required to use this service.
5. The Contractor is required to submit documents in PDF format.
6. Subcontractors, suppliers, Architect's consultants, Owner and Owner's representative(s), are to be permitted to use the service at no extra charge.
7. Users of the service need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
8. Paper document transmittals will not be reviewed; emailed PDF documents will not be reviewed.
9. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to physical samples or color selection charts. Record of transmittal of such physical items is to be made through the electronic submittal service. Architect's action taken on physical items will be transmitted through the electronic submittal service, and physical samples and color selection charts will not be returned to the Contractor.
10. Cost: The cost of the service is to be paid by the Contractor; include the cost of the service in the Contract Sum.
11. Submittal Service: Use one of the following:
 - a. Submittal Exchange (tel: 1-800-714-0024): www.submittalexchange.com.
 - b. ProCore: www.procore.com.
 - c. PlanGrid: www.plangrid.com.

12. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the requesting user of the service.
13. Project Closeout: Architect will determine when to terminate the service for the project. Contractor is responsible for obtaining archive copies of electronic .PDF files from the service provider and transmitting copies to the Architect and Owner.

3.02 PRECONSTRUCTION MEETING

- A. Schedule a meeting at a time convenient to attendees but no later than fifteen (15) days after execution of the construction Agreement.
- B. Attendance Required:
 1. Owner or Owner's representative(s),
 2. Architect
 3. Principal Consultants
 4. Contractor
 5. Principal Subcontractors
- C. Agenda:
 1. Submission of executed bonds and insurance certificates, as applies.
 2. Distribution of Contract Documents.
 3. Submission of list of Subcontractors, list of Products, Schedule of Values, and construction schedule.
 4. Designation of personnel representing the parties to Contract and Architect.
 5. Procedures and processing of requests for interpretation, field decisions, submittals, substitutions, applications for payments, proposal request, change orders, and contract closeout procedures.
 6. Scheduling.
 7. Temporary facilities and controls.
 8. Coordination with Owner's contractor(s).
 9. Air tightness of envelope and air tightness testing.
- D. Record minutes and distribute copies within five (5) business days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Conduct progress meetings on a bi-weekly basis, or as otherwise agreed upon by the Owner, Architect, and Contractor. Notify the Owner and the Architect of scheduled meeting dates and times.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities, shall be represented at these meetings. All participants at the conference shall be familiar with the project and authorized to conclude matters relating to the work.
 2. Agenda: Approve minutes of previous 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 submitted to Owner and Architect. 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 utilization
 - 8) Temporary facilities and controls
 - 9) Work hours
 - 10) Hazards and risks
 - 11) Progress cleaning
 - 12) Quality and work standards

- 13) Status of correction of deficient items
 - 14) Field observations
 - 15) Status of requests for interpretations (RFIs)
 - 16) Status of proposal requests
 - 17) Pending changes
 - 18) Status of change orders
 - 19) Pending claims and disputes
 - 20) Documentation of information for payment requests
3. Minutes: Record and distribute minutes of the meeting to each party present and to parties who should have been present for their review and comment. Minutes must be distributed within five (5) business days of the meeting. Review each party's comments to the minutes prior to the next progress meeting. Redistribute final minutes after comments have been incorporated.
- a. Schedule Updating: Revise construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of minutes from each meeting.

3.04 PREINSTALLATION MEETINGS

- A. Preinstallation Meeting: Conduct a preinstallation meeting at project site before each construction activity that requires coordination with other construction after submittals pertinent to those construction activities have been reviewed and approved.
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 and Owner of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents
 - b. Options
 - c. Related request for interpretations (RFIs)
 - d. Related change orders
 - e. Purchases

- f. Deliveries
 - g. Submittals
 - h. Review of mockups
 - i. Possible conflicts
 - j. Compatibility problems
 - k. Time schedule
 - l. Weather limitations
 - m. Manufacturers written recommendations
 - n. Warranty requirements
 - o. Compatibility of materials
 - p. Acceptability of substrates
 - q. Temporary facilities and controls
 - r. Space and access limitations
 - s. Regulations of authorities have jurisdiction
 - t. Testing and inspecting requirements
 - u. Installation procedures
 - v. Coordination with other work
 - w. Required performance results
 - x. Protection of adjacent work
 - y. 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 parties who should have been present and to the Owner and the Architect. This distribution must take place within five (5) days of the meeting.
 - 5. Do not proceed with installation if the meeting cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the work and reconvene the meeting at earliest feasible date.

3.05 PRECLOSEOUT MEETING

- A. Arrange with the Owner, User Agency and Architect to conduct a precloseout meeting to be held at the project site.
- B. Attendance Required: As stated above in “Progress Meetings” in addition to principle subcontractors.
- C. Agenda:
 - 1. Notification of local Fire Marshal office of the date and time of the punch list inspection.
 - 2. Confirm all equipment is operational.
 - 3. Discuss retainage for punch list work.
 - 4. Discuss Recommendation of Acceptance to be issued by Architect.
 - 5. Confirm roofing warranties have been submitted and are found to be in compliance.
 - 6. Discuss User Agency's letter of concurrence.
 - 7. Review requirements for payment of retainage.
 - 8. Review punch list timeline.
 - 9. Discuss distribution of as-built record documents.
 - 10. Review ADA Non-Comprehensive Field Checklist.

3.06 COORDINATION

- A. Coordination: Coordinate construction operations included in different sections of the Contract Documents to ensure efficient and orderly installation of each part of the work. Coordinate construction operations, including different sections that depend on each other for proper installation, connection, and operation.
 - 1. Review project documents for the proper fitting of all systems and components into the building as required and without interference. Take particular care to fit piping, ductwork, conduit, wiring, structure and equipment. Exercise judgment to secure best possible headroom, door and window clearance, and space conditions throughout; secure neat arrangement for piping, equipment, wiring and conduit, and overcome all local difficulties and interferences to best advantage.
 - 2. 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 and after its own installation.
 - 3. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.

4. Make adequate provisions to accommodate items schedule for later installation.
5. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
6. Prepare memorandum 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. Prepare similar memoranda for Owner and separate contractors if coordination of their work is required.
7. Administrative procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:
 - a. Preparation of Contractor's construction schedule
 - b. Preparation of the schedule of values
 - c. Installation and removal of temporary facilities and controls
 - d. Delivery and processing of submittals
 - e. Progress meetings
 - f. Preinstallation conferences
 - g. Project closeout activities
 - h. Critical path analysis and updates.

3.07 REQUESTS FOR INTERPRETATION (RFI)

- A. Immediately upon discovery of the need for additional information or interpretation of the Contract Documents, prepare and submit an RFI. RFI numbers are to begin with "001", and shall not be duplicated.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.

6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. Architect will review each RFI and determine required action and response.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow for a minimum of seven (7) calendar days for Architect's response for each RFI. RFIs received by the Architect after 4:00 pm, CST, will be considered as received the following calendar day.
1. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information from Contractor.
 2. The nature of the RFI may require additional time for the Architect to provide a response. In these cases, the Architect will notify the Contractor that additional review time will be required beyond the time given the Architect in the Contract Documents to provide a response.
- E. The following RFIs will be returned without action:
1. Requests for approval of submittals.
 2. Requests for approval of substitutions.
 3. Requests for approval of Contractor's means and methods.
 4. Requests for coordination information already indicated in the Contract Documents.
 5. Requests for adjustments in the Contract Time or the Contract Sum.

6. Requests for interpretation of Architect's actions on submittals.
 7. Incomplete RFIs or inaccurately prepared RFIs.
 8. Requests to coordinate the Contractor's work.
 9. Requests submitted directly from Contractor's Subcontractors or Suppliers
- 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 in writing within four (4) calendar days if Contractor disagrees with response.

END OF SECTION 01 31 00

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes administrative and procedural requirements for documenting the progress of construction during performance of the work, including the following:
 - 1. Preliminary Construction Schedule
 - 2. Contractor's Construction Schedule
 - 3. Photographic Documentation
 - 4. Submittal Schedule
 - 5. Daily Construction Reports
 - 6. Material Location Reports
 - 7. Field Condition Reports
 - 8. Special Reports
- B. Related Sections include the following:
 - 1. Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION: For submitting and distributing meeting and conference minutes for project record documents.
 - 2. Section 01 29 00 - PAYMENT PROCEDURES: For submitting submittals schedule and Preliminary Construction Schedule.
 - 3. Section 01 33 00 - SUBMITTAL PROCEDURES: For submitting schedules and reports.
 - 4. Section 01 40 00 - QUALITY REQUIREMENTS: For submitting a schedule of tests and inspections.

1.02 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 activities are activities on the critical path. They must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.

- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. 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.
- F. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- G. Major Area: A story of construction, a separate building, or a similar significant construction element.
- H. Milestone: A key or critical point in time for reference or measurement.
- I. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.
- J. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.03 SUBMITTALS

- A. Key Plan for Photographic Documentation: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph and video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Format: Unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.

2. Identification: Provide the following information with each image description in file metadata tag:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.
- C. Construction Photographs: Submit copies of each photographic view within seven days of taking photographs.
 1. Identification: For each image, provide the following information:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken if not date stamped by camera.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.
- D. Submittals Schedule: Submit electronic copy of schedule.
- E. Preliminary Construction Schedule: Submit two (2) printed copies and electronic copy in both .PDF format and software's native file formats.
 1. Approval of cost-loaded preliminary construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- F. Preliminary Network Diagram: Submit two (2) printed copies, large enough to show entire network for entire construction period. Show logic ties for activities.
- G. Contractor's Construction Schedule: Submit two (2) printed copies of initial schedule, large enough to show entire schedule for entire construction period.

1. Submit an electronic copy of schedule, in both .PDF format and software's native file formats, on CD-R, and labeled to comply with requirements of submittals. Include type of schedule (initial or updated) and date on label.
- H. CPM Reports: Concurrent with CPM schedule, submit copies of each of the following computer generated reports. Format for each activity is 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 all 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 all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 3. Total Float Report: List of all activities sorted in ascending order of total float.
 4. Earnings Report: Compilation of Contractor's total earnings from notice to proceed until most recent application for payment.
- I. Daily Construction Reports: Submit copies at monthly intervals unless otherwise required by Owner.
- J. Material Location Reports: Submit copies at monthly intervals.
- K. Field Condition Reports: Submit at time of discovery of differing conditions.
- L. Special Reports: Submit at time of unusual event.

1.04 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 or Owner's request.
- B. Prescheduling Conference: Conduct conference at project site to comply with requirements in Division 1 Section "Project Management and Coordination". Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule.
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 and interim milestones.
 4. Review delivery dates for Owner furnished products.
 5. Review time required for review of submittals and resubmittals.

6. Review requirements for tests and inspections by independent testing and inspecting agencies.
7. Review time required for completion and startup procedures.
8. Review and finalize lists of construction activities to be included in schedule.
9. Review submittal requirements and procedures.
10. Review procedures for updating schedule.

1.05 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittals schedule, progress reports, payment requests, and other required schedules and reports.
 1. Secure time commitments for performing critical elements of the work from parties involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.06 USAGE RIGHTS

- A. If necessary, obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.01 SUBMITTALS SCHEDULE

- A. Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Arrange the following information in a tabular format:
 1. Scheduled date for first submittal
 2. Specification section number and title
 3. Submittal category (action or informational)
 4. Name of subcontractor / supplier
 5. Description of the work covered
 6. Scheduled date for Architect's final release or approval

- B. Include time required for review, resubmittal(s), ordering, manufacturing, fabrication, and delivery when establishing dates.
- C. Coordinate submittals schedule with list of subcontracts, schedule of values, and the Contractor's construction schedule.
- D. The Architect will comment on the submittal schedule and note submittals which must be submitted concurrently for review. The Contract Sum or Time will not be increased or extended, respectively, for adverse impacts to the Work due to failure of the Contractor to provide submittals concurrently that the Architect has marked.
- E. No submittals will be reviewed by the Architect until the submittals schedule is approved.

2.02 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in .JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

2.03 CONTRACTOR'S CONSTRUCTION SCHEDULE GENERAL

- A. Time Frame: Extend schedule from date established for the notice to proceed to date of substantial 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.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than twenty (20) days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than sixty (60) days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittals schedule.
 - 4. Startup and testing Time: Include days for startup and testing indicated in mechanical and electrical documents.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work Under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 1 Section "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 01 10 00 - Summary. Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restriction: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies
 - c. Uninterruptible services
 - d. Partial occupancy before substantial completion
 - e. Use of premises restrictions
 - f. Provision for future construction
 - g. Seasonal variations
 - h. Environmental control
 7. Work Stages: Indicate important stages of construction for each major portion of the work, including, but limited to the following:
 - a. Subcontract awards
 - b. Submittals
 - c. Purchases
 - d. Mockups
 - e. Fabrication
 - f. Sample testing

- g. Deliveries
 - h. Installation
 - i. Tests and inspections
 - j. Adjusting
 - k. Curing
 - l. Startup and placement into final use and operation.
- 8. Area Separations: 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. permanent space enclosure
 - c. Completion of mechanical installation
 - d. Completion of electrical installation
 - e. Substantial completion
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the notice to proceed, substantial completion, and final completion.
- E. Contract modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis to demonstrate the effect of the proposed change on the overall project schedule.
- F. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.

2.04 PRELIMINARY CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule within seven (7) days of date established for the notice to proceed.
- 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 sixty (60) days of construction.
 - 1. Include skeleton diagram for the remainder of the work.

2.05 CONTRACTORS CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.

- B. Preliminary Network Diagram: Submit diagram with fourteen (14) days of date established for the notice to proceed. Outline significant construction activities for the first sixty (60) days of construction.
 - 1. Include skeleton diagram for the remainder of the work.
- C. CPM Schedule: Prepare Contractor's construction schedule using a computerized, time-scaled CPM network analysis diagram for the work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than thirty (30) days after date established for the notice to proceed.
 - a. Failure to include any work item required for performance of this contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
 - 2. Conduct educational workshops to train and inform key project personnel including subcontractor's personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 4. Use "one workday" as the unit of time. Include list of nonworking days and holidays incorporated into the schedule.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the work. Using the preliminary network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals
 - b. Mobilization and demobilization
 - c. Purchase of materials
 - d. Delivery
 - e. Fabrication
 - f. Utility interruptions
 - g. Installation
 - h. Work by Owner that may affect or be affected by Contractor's activities
 - i. Testing

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the contract time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- E. Initial Issue of Schedule: Prepare initial network diagram from a list of straight “early start-total float” sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the work activity.
 2. Description of activity.
 3. Principal vents of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
- F. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates
 3. Changes in early and late finish dates
 4. Changes in activity durations in workdays
 5. Changes in critical path
 6. Changes in total float or slack time
 7. Changes in the contract time

2.06 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at project site.
1. List of subcontractors at project site
 2. List of separate contractors at project site
 3. Approximate count of personnel at project site
 4. Equipment at project site
 5. Material deliveries
 6. High and low temperatures and general weather conditions
 7. Accidents
 8. Meetings and significant decisions
 9. Unusual events (refer to special reports)
 10. Stoppages, delays, shortages, and losses
 11. Meter readings and similar recordings
 12. Emergency procedures
 13. Orders and requests of authorities having jurisdiction
 14. Change orders received and implemented
 15. Construction change directives received and implemented
 16. Services connected and disconnected
 17. Equipment or system tests and startups
 18. Partial completions and occupancies
 19. Substantial completions authorized
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from project site.

- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.07 SPECIAL CONDITIONS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at project site, whether or not related directly to the work, submit electronic notification immediately and prepare and submit a special report. List chain of events, persons participating, and response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.01 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - 1. Date and Time: Include date and time in file name for each image.
 - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.
- C. Preconstruction Photographs: Before commencement of mobilization, demolition and starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Flag construction limits before taking construction photographs.
 - 2. Take at least twelve (12) photographs to show existing conditions adjacent to property before starting the Work.
 - 3. Take at least twelve (12) photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

- D. Periodic Construction Photographs: Take thirty-six (36) photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Time-Lapse Sequence Construction Photographs: Take twelve (12) photographs as indicated, to show status of construction and progress since last photographs were taken.
 - 1. Frequency: Take photographs monthly, coinciding with the cutoff date associated with each Application for Payment.
 - 2. Vantage Points: Following suggestions by Architect and Contractor, photographer to select vantage points. During each of the following construction phases, take not less than four of the required shots from same vantage point each time to create a time-lapse sequence as follows:
 - a. Commencement of the Work, through completion of subgrade construction.
 - b. Above-grade structural framing.
 - c. Exterior building enclosure.
 - d. Interior Work, through date of Substantial Completion.
- F. Final Completion Construction Photographs: Take thirty six (36) photographs after date of Substantial Completion for submission as project record documents. Architect will inform photographer of desired vantage points.

3.02 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.
 - 1. In-House Option: Owner may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
 - 2. Meetings: Scheduling consultant shall attend all meetings related to project progress, alleged delays, and time impact.
- B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.

3. As the work progresses, indicate actual completion percentage for each activity.
- C. 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.

END OF SECTION 01 32 00

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes administrative and procedural requirements for submitting product data, shop drawings, samples and other submittals.
- B. Related Sections include the following:
 - 1. Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION: For project record document, for submitting and distributing meeting and conference minutes and for submitting coordination drawings.
 - 2. Section 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION: For submitting construction schedules, reports, submittals schedule, and photographic documentation.
 - 3. Section 01 40 00 - QUALITY REQUIREMENTS: For submitting test and inspection reports and for mockup requirements.
 - 4. Section 01 77 00 - CLOSEOUT PROCEDURES: For submitting warranties, record drawings, record specifications, record product data, and operation and maintenance manuals.
 - 5. Refer to individual sections for specific requirements for submittals in those sections.

1.02 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.03 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the work so processing will not be delayed because of need to review submittals concurrently for coordination.

- a. Architect shall withhold action on a submittal requiring coordination with other submittals until related submittals are received. Architect shall advise Contractor when a submittal being processed must be delayed for coordination.
- B. Submittal Schedule: Comply with requirements in Division 1 "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. The Contract Sum or Time will not be increased or extended, respectively, due to failure of the Contractor to transmit submittals enough in advance of the work to permit processing, including resubmittals.
 1. Initial review: Allow a minimum of fifteen (15) days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow a minimum of fifteen (15) days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow a minimum of twenty-eight (28) days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and Architect's consultants, allow a minimum of twenty-one (21) days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
 6. Extended Review: Where individual submittals exceed twenty (20) sheets, the Architect will establish a reasonable additional period beyond the time limits established above or alternatively, the submittal can be split in a manner that expedites the construction sequence.
- D. Identification: Place a permanent label or title block on each submittal for identification.
 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 5 by 6 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name
 - b. Date

- c. Name and address of Architect
 - d. Name and address of Contractor
 - e. Name and address of subcontractor
 - f. Name and address of supplier
 - g. Name of manufacturer
 - h. Submittal number or other unique identifier, including revision identifier
 - i. Number and title of appropriate specification section and applicable subsection(s)
 - j. Drawing number and detail references, as appropriate
 - k. Location(s) where product is to be installed, as appropriate
 - l. Other necessary identification
- E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals. In color, conspicuously note deviations with "Architect/Engineer please note: This is a deviation from the Contract Documents" and describe the reason for the deviation.
- F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor. Only the Contractor should ever be in contact directly with the Architect or the Architect's consultants.
- 1. Transmittal Form: Form to be used will be given to the Contractor, by the Architect, with instructions as to the proper use of the form.
 - 2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, request for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal. Highlight, encircle, or otherwise specifically identify revisions from the prior submittals.
- 1. Distribution: Furnish copies of final submittals to Owner, manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal form.
- H. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.

1.04 CONTRACTOR'S USE OF ARCHITECT'S AND CONSULTANTS' CAD FILES

- A. Architect's CAD Files: At Contractor's written request, select copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with the project, subject to limitations on incorporating modifications, limitation of CAD system formats, limitation on CAD entity attributes and layering, restriction on Contractor's use, and Architect's cost of providing files.
 - 1. The Architect's CAD files to be received by the Contractor shall be limited in nature as follows:
 - a. Floor plans and reflected ceiling plans shall be provided and will not contain dimensions, notes, or description of materials.
 - b. Building wall sections, if any, shall be provided and will not contain dimensions, notes, or description of materials.
 - c. No other drawing sheets will be provided.
- B. Architect's Consultant's CAD Files: At Contractor's written request, copies of the Architect's consultants' CAD files will be provided to Contractor for Contractor's use in connection with the project. The Contractor shall be required to sign a separate agreement for use of the Architect's consultant's CAD files. The Contractor is required to sign both the Architect's Digital Data Licensing Agreement and the Architect's Consultants' agreement(s) in order to receive the Consultants' CAD files.
- C. Digital Data Licensing Agreement: The Contractor shall be required to sign the Architect's Digital Data Licensing Agreement to receive select CAD files from the Architect. The Contractor's subcontractors and suppliers are not required to individually execute the agreement, as they are bound to the requirements of the agreement by the Contractor's signature. The Architect will determine the method to transfer CAD files to the Contractor after Contractor's execution of the Digital Data Licensing Agreement.
- D. No CAD files will be transmitted to the Contractor without execution of the Architect's Digital Data Licensing Agreement. The Contractor may request a copy of the Architect's Digital Data Licensing Agreement prior to bid.

PART 2 - PRODUCTS

2.01 ACTION SUBMITTALS

- A. General: Prepare and submit action submittals required by individual specification sections. Action submittals may also be listed under the heading "Submittals" in individual specification sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as shop drawings, not as product data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cut sheets
 - b. Manufacturer's written recommendations
 - c. Manufacturer's product specifications
 - d. Manufacturer's installation instructions
 - e. Standard color charts
 - f. Statement of compliance with specified referenced standards
 - g. Testing by recognized testing agency
 - h. Notation of coordination requirements
 - i. Availability and delivery time information
 - j. Mill reports
 - k. Standard product operation and maintenance manuals
 - l. Compliance with specified referenced standards
 - m. Application of testing agency labels and seals
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring
 - b. Printed performance curves
 - c. Operational range diagrams
 - d. Clearance required to other construction, if not indicated on accompanying Shop Drawings
 5. Submit Product Data before or concurrent with samples and shop drawings.
- C. Shop Drawings: Prepare project specific information, drawn accurately to scale. Do not base shop drawings on reproductions of the Contract Documents, standard printed product data, standard product details, or standard product installation methods.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions
 - b. Identification of products
 - c. Fabrication and installation drawings
 - d. Roughing-in and setting diagrams
 - e. Wiring diagrams showing field-installed wiring, including power, signal, data and control wiring
 - f. Shop work manufacturing instructions
 - g. Templates and patterns
 - h. Schedules
 - i. Compliance with specified standards
 - j. Notation of coordinating requirements
 - k. Notation of dimensions established by field measurement
 - l. Relationship to adjoining construction clearly indicated
 - m. Seal and signature of professional engineer, if required
 - n. Design calculations, if required
 - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring
- D. Samples: Submit samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 1. Transmit samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of samples that includes the following:
 - a. Generic description of sample
 - b. Product name and name of manufacturer
 - c. Sample source
 - d. Number and title of appropriate specification section

3. Disposition: Maintain sets of approved samples at project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the work are indicated in individual specification sections. Such samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the work, or otherwise designated as Owner's property, are the property of the Contractor.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing 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. Electronically submitted color charts are not acceptable; submit physical color charts for review. Architect will return submittal with selection noted.
5. Samples for Verification: Submit full-size units or samples of size indicated, prepared from same material to be used for the work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three (3) sets of samples. Architect will retain two (2) sample sets; remainder will be returned. Mark up and retain returned sample as a project record sample.
 - 1) Submit a single sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristics is inherent in material or product represented by a sample, submit at least three (3) sets of paired units that show approximate limits of variations.
- E. Products Schedule or List: As required in individual specifications 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
 2. Number and name of room or space
 3. Location within room or space

- F. Submittals Schedule: Comply with requirements in Division 1 “Construction Progress Documentation”.
- G. Coordination Drawings: Comply with requirements specified in Division 1 section “Project Management and Coordination”.
- H. Schedule of Values: Comply with requirements specified in Division 1 section “Payment Procedures” and bid requirements.
- I. Subcontractor List: Prepare a written summary identifying individuals or firms proposed for each portion of the work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related specification section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

2.02 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit informational submittals required by other specification sections.
 - 1. Number of Copies: Submit electronic copies of each submittal, unless otherwise indicated. Architect will not return copies.
 - 2. Certificate and Certifications: Provide a notarized 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.
 - 3. Test and Inspection Reports: Comply with requirements specified in Division 1 section “Quality Requirements”.
- B. Key Plan for Photographic Documentation: Comply with requirements specified in Division 1 Section “Construction Progress Documentation”.
- C. Digital Photographs: Comply with requirements specified in Division 1 Section “Construction Progress Documentation”.
- D. Construction Photographs: Comply with requirements specified in Division 1 Section “Construction Progress Documentation”.
- E. Preliminary Construction Schedule: Comply with requirements specified in Division 1 Section “Construction Progress Documentation”.
- F. Preliminary Network Diagram: Comply with requirements specified in Division 1 Section “Construction Progress Documentation”.

- G. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation".
- H. CPM Reports: Comply with requirements specified in Division 1 Section "Construction Progress Documentation".
- I. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- J. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of welding procedure specification (WPS) and procedure qualification record (PQR) on AWS forms. Include names or firms and personnel certified.
- K. Installer Certificates: Prepare 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 specified project.
- L. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- M. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- N. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- O. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- P. Product Test Reports: Prepare written reports indicating 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.
- Q. Research/Evaluation: Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for project. Include the following information:
 - 1. Name of evaluation organization
 - 2. Date of evaluation
 - 3. Time period when report is in effect
 - 4. Product and manufacturer's names

- 5. Description of product
- 6. Test procedures and results
- 7. Limitations of use
- R. Sample Warranty
- S. Windborne-Debris-Impact-Resistance Performance Test Report
- T. Daily Construction Reports
- U. Material Location Reports
- V. Field Condition Reports
- W. Special Reports
- X. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section “Quality Requirements”.
- Y. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency’s standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- Z. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency’s standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- AA. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency’s standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- BB. Operation and Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section “C”.
- CC. Warranty.
- DD. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

EE. Manufacturer's Instruction: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates
2. Required substrate tolerances
3. Sequence of installation or erection
4. Required installation tolerances
5. Required adjustments
6. Recommendations for cleaning and protection

FF. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

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

GG. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductible, if any, and term of coverage.

HH. Building Permit: Submit building permit from authority having jurisdiction.

II. Material Safety Data Sheets (MSDSs): Submit information directly to Owner: do not submit to Architect, except as required in "Action Submittals" article.

1. Architect will not review submittals that include MSDS and will return them for submittal to the Owner.

2.03 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to shop drawings, product data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
 - 2. Calculations and drawings for the Delegated-Design Submittal are to be prepared specifically for the Project and are based on the configuration of work indicated in the Contract Documents. Calculations and drawings that are not Project specific are not acceptable and will be returned to the Contractor with no action taken.

PART 3 - EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform approval stamp. Include project name and location, submittal number, specification section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with Contract Documents.
 - 1. The Contractor's submittal stamp shall contain the following statement: "This submittal has been reviewed and approved for compliance with the Contract Documents."

3.02 ARCHITECT'S ACTIONS

- A. General:
 - 1. Architect will forward each submittal to appropriate party.
 - 2. Architect will not review submittals that do not bear Contractor's approval stamp.

- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. Unless otherwise indicated on the submittal, fabrication/installation may be undertaken and a resubmittal is not required, if the review action marking, the stamp, indicates:
 - a. "Approved as Submitted" or "Approved, except as Noted. Resubmission not required".
 - 2. Unless otherwise indicated on the submittal, fabrication/installation may NOT be undertaken and a resubmittal IS required, if the review action marking, the stamp, indicates:
 - a. Approved, except as noted. Resubmission required." or "No action taken. See comments. Resubmission required." or "Disapproved. See comments. Resubmission required."
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it with the stamp indicating "No action required. For information only."
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review. All required submittals in a specification section shall be submitted concurrently.
- E. Submittals shall not be combined with other submittals upon submission to the Architect, as the Architect will take separate action on each submittal. Combined submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- F. Submittals not required by the Contract Documents may not be reviewed and shall be discarded.

END OF SECTION 01 33 00

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

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

1.02 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

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

1.03 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum within reasonable limits. To comply with these requirements, indicate whether numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Architect for decision before proceeding.
- C. The Contract Sum or Time will not be increased or extended, respectively, for adverse impacts to the Work due to the Contractor proceeding with conflicting quality or quantity levels without first notifying the Architect.

1.04 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.05 INFORMATIONAL SUBMITTALS

- A. Permits, Licenses, and Certificates: For Owner's records, 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.
- B. 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.
- C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.06 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- 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 installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.

- d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.07 QUALITY CONTROL

- A. Special Tests and Inspections: Contractor will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction and tests indicated in the individual Sections of the Specifications.
 1. Testing agency will notify Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 5. Testing agency will retest and reinspect corrected work.
- B. 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.
- 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 revised or replaced Work that failed to comply with requirements established by 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. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
 5. Do not perform any duties of Contractor.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field-curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- F. 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 inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- G. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Architect, Commissioning Authority, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

- H. Building Envelope: It is the intent of the Construction Documents that the Project be constructed free of water infiltration, excessive air infiltration, excessive moisture or relative humidity build-up in building materials, and that continuous thermal barriers against excessive heat loss or gain are maintained. The proper use of specified materials is essential to ensure this performance. It is the responsibility of the Contractor to review the Documents carefully and advise the Architect of any concerns or recommendations in regard to potential problem areas. It is also the responsibility of the Contractor, during construction, to coordinate the work to ensure that the integrity of the continuous waterproofing and thermal envelope be maintained.

PART 2 - PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
- 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 01 40 00

SECTION 01 42 00
REFERENCES

PART 1 - GENERAL

1.01 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. Other definitions are included elsewhere in the Contract Documents.
- C. "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. NOTE: Shop drawings, product data, samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the work for which the Contract Documents require submittals. Review by the Architect/Owner is subject to the limitations of the "General Conditions" of the contract.
- D. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- E. "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."
- 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. "Include": Same as Provide.
- I. "Product": Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection, and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- J. "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.
- K. "Provide": Furnish and install, complete and ready for the intended use.
- L. "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.

M. "Supply": Same as Furnish.

1.02 INDUSTRY STANDARDS

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

1.03 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information 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; www.aamanet.org.
 - 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 - 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 - 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 - 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 - 7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
 - 8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 - 9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 - 10. AF&PA - American Forest & Paper Association; www.afandpa.org.
 - 11. AGA - American Gas Association; www.aga.org.
 - 12. AGC – The Associated General Contractors of America

13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.

37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc. (Building Industry Consulting Service International); www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
49. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
50. CDA - Copper Development Association; www.copper.org.
51. CEA - Canadian Electricity Association; www.electricity.ca.
52. CEA - Consumer Electronics Association; www.ce.org.
53. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.

60. CPA - Composite Panel Association; www.pbmdf.com.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - Canadian Standards Association; www.csa.ca.
65. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
66. CSI - Construction Specifications Institute (The); www.csinet.org.
67. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
69. CWC - Composite Wood Council; (See CPA).
70. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
71. DHI - Door and Hardware Institute; www.dhi.org.
72. ECA - Electronic Components Association; www.ec-central.org.
73. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
74. EIA - Electronic Industries Alliance; (See TIA).
75. EIMA - EIFS Industry Members Association; www.eima.com.
76. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
77. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
78. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. EVO - Efficiency Valuation Organization; www.evo-world.org.
80. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
81. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
82. FM Approvals - FM Approvals LLC; www.fmglobal.com.
83. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.

84. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarooft.com.
85. FSA - Fluid Sealing Association; www.fluidsealing.com.
86. FSC - Forest Stewardship Council U.S.; www.fscus.org.
87. GA - Gypsum Association; www.gypsum.org.
88. GANA - Glass Association of North America; www.glasswebsite.com.
89. GS - Green Seal; www.greenseal.org.
90. HI - Hydraulic Institute; www.pumps.org.
91. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
92. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
93. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
94. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
95. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
96. IAS - International Approval Services; (See CSA).
97. ICBO - International Conference of Building Officials; (See ICC).
98. ICC - International Code Council; www.iccsafe.org.
99. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
100. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
101. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
102. IEC - International Electrotechnical Commission; www.iec.ch.
103. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
104. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
105. IESNA - Illuminating Engineering Society of North America; (See IES).
106. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
107. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
108. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.

109. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
110. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
111. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
112. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
113. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
114. ISO - International Organization for Standardization; www.iso.org.
115. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
116. ITU - International Telecommunication Union; www.itu.int/home.
117. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
118. LMA - Laminating Materials Association; (See CPA).
119. LPI - Lightning Protection Institute; www.lightning.org.
120. MBMA - Metal Building Manufacturers Association; www.mbma.com.
121. MCA - Metal Construction Association; www.metalconstruction.org.
122. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
123. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
124. MHIA - Material Handling Industry of America; www.mhia.org.
125. MIA - Marble Institute of America; www.marble-institute.com.
126. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmmpa.com.
127. MPI - Master Painters Institute; www.paintinfo.com.
128. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
129. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
130. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
131. NADCA - National Air Duct Cleaners Association; www.nadca.com.

132. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
133. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
134. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
135. NCMA - National Concrete Masonry Association; www.ncma.org.
136. NEBB - National Environmental Balancing Bureau; www.nebb.org.
137. NECA - National Electrical Contractors Association; www.necanet.org.
138. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
139. NEMA - National Electrical Manufacturers Association; www.nema.org.
140. NETA - InterNational Electrical Testing Association; www.netaworld.org.
141. NFHS - National Federation of State High School Associations; www.nfhs.org.
142. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
143. NFPA - NFPA International; (See NFPA).
144. NFRC - National Fenestration Rating Council; www.nfrc.org.
145. NHLA - National Hardwood Lumber Association; www.nhla.com.
146. NLGA - National Lumber Grades Authority; www.nlga.org.
147. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
148. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
149. NRCA - National Roofing Contractors Association; www.nrca.net.
150. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
151. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
152. NSPE - National Society of Professional Engineers; www.nspe.org.
153. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
154. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
155. NWFA - National Wood Flooring Association; www.nwfa.org.
156. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
157. PDI - Plumbing & Drainage Institute; www.pdionline.org.

158. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
159. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
160. RFCI - Resilient Floor Covering Institute; www.rfci.com.
161. RIS - Redwood Inspection Service; www.redwoodinspection.com.
162. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
163. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
164. SDI - Steel Deck Institute; www.sdi.org.
165. SDI - Steel Door Institute; www.steeldoor.org.
166. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
167. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
168. SIA - Security Industry Association; www.siaonline.org.
169. SJI - Steel Joist Institute; www.steeljoist.org.
170. SMA - Screen Manufacturers Association; www.smainfo.org.
171. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
172. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
173. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
174. SPIB - Southern Pine Inspection Bureau; www.spib.org.
175. SPRI - Single Ply Roofing Industry; www.spri.org.
176. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
177. SSINA - Specialty Steel Industry of North America; www.ssina.com.
178. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
179. STI - Steel Tank Institute; www.steeltank.com.
180. SWI - Steel Window Institute; www.steelwindows.com.
181. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
182. TCA - Tilt-Up Concrete Association; www.tilt-up.org.

183. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America);
www.tileusa.com.
184. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
185. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance);
www.tiaonline.org.
186. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
187. TMS - The Masonry Society; www.masonrysociety.org.
188. TPI - Truss Plate Institute; www.tpinst.org.
189. TPI - Turfgrass Producers International; www.turfgrasssod.org.
190. TRI - Tile Roofing Institute; www.tilerroofing.org.
191. UBC - Uniform Building Code; (See ICC).
192. UL - Underwriters Laboratories Inc.; www.ul.com.
193. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
194. USAV - USA Volleyball; www.usavolleyball.org.
195. USGBC - U.S. Green Building Council; www.usgbc.org.
196. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
197. WASTEC - Waste Equipment Technology Association; www.wastec.org.
198. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
199. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
200. WDMA - Window & Door Manufacturers Association; www.wdma.com.
201. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California);
www.wicnet.org.
202. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
203. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
204. WPA - Western Wood Products Association; www.wwpa.org.

- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. 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.
- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. COE - Army Corps of Engineers; www.usace.army.mil.
 2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
 3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
 4. DOD - Department of Defense; <http://dodssp.daps.dla.mil>.
 5. DOE - Department of Energy; www.energy.gov.
 6. EPA - Environmental Protection Agency; www.epa.gov.
 7. FAA - Federal Aviation Administration; www.faa.gov.
 8. FG - Federal Government Publications; www.gpo.gov.
 9. GSA - General Services Administration; www.gsa.gov.
 10. HUD - Department of Housing and Urban Development; www.hud.gov.
 11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; <http://eetd.lbl.gov>.
 12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
 13. SD - Department of State; www.state.gov.
 14. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
 15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.

16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
 17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
 18. USP - U.S. Pharmacopeia; www.usp.org.
 19. USPS - United States Postal Service; www.usps.com.
 20. VA - Department of Veterans Affairs; www.va.gov.
 21. VACFM - Department of Veterans Affairs, Office of Construction & Facilities Management; www.cfm.va.gov.
- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
 2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
 3. DSCC - Defense Supply Center Columbus; (See FS).
 4. FED-STD - Federal Standard; (See FS).
 5. FS - Federal Specification; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
 6. MILSPEC - Military Specification and Standards; (See DOD).
 7. USAB - United States Access Board; www.access-board.gov.
 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

EDR Project No. 23083

21 February 2025

1031 Annunciation
Permit and Pricing Set

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 42 00

REFERENCES

01 42 00 - 13

SECTION 01 43 39
MOCK-UPS

PART 1 – GENERAL

1.01 MOCK-UPS

A. General mock-up requirements:

1. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution/craftsmanship; to review coordination, testing, or operation; to review compatibility; to show interface between dissimilar materials; to test water infiltration performance; to provide Contractor with opportunity to coordinate subcontractor Work; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples.
2. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

B. Intent of exterior building, finishes and field-testing mock-ups is to permit review of appearance, quality of workmanship, coordination, compatibility, and relationships with adjacent materials, and to provide Contractor with opportunity to coordinate Subcontractor Work.

1. Maintain quality control over Work of various Sections of Specifications, manufacturers, products, services, workmanship, and site conditions to produce mock-ups in accordance with the Contract Documents.
2. Mock-ups include, but are not necessarily limited to, the following:
 - a. Freestanding Exterior Building Mockup.
 - b. In Situ Mockups.
 - c. Other mock-ups as indicated in the Contract Documents.

1.02 SUMMARY

- A. Provide a freestanding exterior building mock-up to permit review of appearance, quality of workmanship, coordination, compatibility, and relationships with adjacent materials. The Contractor shall provide composite mock-up drawings prior to fabrication for approval by the Architect. Mock-up shall be constructed out of sequence and will not be incorporated into the final building. The mock-up will stand through the completion of the building exterior and serve as the standard for workmanship once it has been accepted in writing by the Architect. Provide the following exterior building mock-ups:

1. Exterior wall assembly systems and finishes, including all transitions and interfaces between different materials and walls to openings. This is a single comprehensive mock-up.
 2. Mock-up size to be a minimum of $\diamond 10'$ wide by $\diamond 10'$ tall unless otherwise noted.
- B. In Situ Mock-ups: Provide mock-ups of materials and assemblies referencing this Section. Mock-ups shall show materials and workmanship to be expected in the completed work. Make necessary revisions as required until each special finishes mock-up is accepted by the Architect. Accepted mock-ups will be allowed to remain in place.
- C. Field Performance Testing: In situ mock-ups shall be tested in accordance with referenced test procedures and accepted prior to installation of the balance of the respective assembly.

1.03 SUBMITTALS

- A. Mock-ups shall not be fabricated until after acceptance of required submittals for all finish materials to be incorporated into the mock-ups. Project schedule shall take into account early submittal of these components to the Architect.
- B. Submit shop drawings for the mock-up that integrate shop drawings of each finish material and footings and bracing. Clearly identify components and materials to be integrated into the assembly.
- C. Prior to construction of mock-ups, provide material samples as specified in the respective Specification Sections included as part of the mock-ups.

1.04 QUALITY ASSURANCE

- A. Performance: Mock-ups shall be constructed for the Architect's review for compliance with the Contract Documents.
- B. Modify mock-ups, or construct or install new components if requested by the Architect, until final acceptance is obtained.
- C. Following acceptance, mock-ups shall serve as a performance standard of quality and appearance of the Work it represents, including the interface with adjacent materials and components as applicable.
- D. Coordinate fabrication, delivery, assembly, and installation with related materials to be included in the mock-ups. Construction of the mock-up assemblies shall be under the supervision of the same personnel who will be employed for the subsequent work.
- E. Maintain mock-ups in neat, clean condition until removal or final acceptance. Repair damage as required to maintain in condition suitable for review and approval.
- F. Accepted in situ mock-ups may be incorporated into the work.
- G. Scheduling:

1. Construct mock-ups in a timely manner to permit review and modifications such that the work is not delayed.
2. Do not proceed with ordering of components or start construction until after mock-up acceptances have been obtained and Architect has approved.
3. Provide the Architect not less than a 7 day notice of the time each component is ready for review.
4. Include line item in the construction schedule for the exterior building mock-up, showing submittals, construction, review, and approval periods.
5. Allow sufficient time in the schedule to accommodate failures of tests and necessity to modify and retest. The mock-up shall be erected in sufficient time to allow final approval of window frame color, glass selection, and sealant colors.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. As specified in the respective Sections of the Specifications.

2.02 EXTERIOR BUILDING MOCK-UPS

- A. Purpose: Establish standards for work indicated and specified to be included in mock-up to demonstrate quality of workmanship, materials, colors, and textures required by the Contract Documents. Include windows, sealants, siding, flashing, and other exterior materials.
1. Mock-up will be used to test color and material alternatives and to review and accept final colors, textures and workmanship. A maximum of 5 different colors may be tested as the mock-up for each component.
 2. Interior finishes will not be required to be installed on the interior side of the exterior building mock-up.
 3. Exterior mock-up shall be a single mock-up to include:
 - a. Brick
 - b. Plaster
 - c. Windows
 - d. Parapet coping
 - e. Metal railing
- B. Location: As indicated on the Drawings or as approved by Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installers proposed for use on the actual work shall install the mock-ups. Personnel representing manufacturers, fabricators, and installers of exterior wall components shall be present during mock-up construction and testing as appropriate for efficient evaluation and revision if required.

3.02 SEQUENCE OF INSPECTION

- A. Notify the Architect at the start of construction of mock-ups and transmit progress reports to allow the Architect to schedule reviews.
- B. Visual examination of mock-ups shall be made by the Architect.
- C. After approximately 50 percent of each mock-up has been built, request the Architect's preliminary review before completion. Incorporate visual and technical changes or variations requested by the Architect into mock-ups during their construction and prior to their completion.
- D. Obtain the Architect's acceptance of visual and technical qualities of mock-ups before commencing the corresponding work for the Project.
- E. Should the mock-ups fail to meet the requirements, it shall be taken down or dismantled, and reconstructed to the extent necessary, until acceptance has been obtained.
- F. Time the completion and reworking of mock-ups necessary to obtain acceptance to avoid delay in the construction schedule of the Project. Update the Construction Schedule to reflect required revisions to mock-ups.
- G. Maintain and protect mock-ups during construction to serve as a standard for judging work incorporated into the Project. Do not alter, remove, or destroy remote mock-ups until authorized by the Architect.

3.03 TESTING PROCEDURES

- A. Conduct tests of mock-ups in the presence of the Architect, the Contractor, the Installer and the Owner. Proceed with each test only after acceptance of the detailed outline of test procedure.
- B. Tests: Make the following tests of the required in-situ mock-ups:
 - 1. Water Penetration: ASTM E 1105. Test to full design pressure without derating. No water intrusion is acceptable. The definition of water intrusion includes any water visible from the finished building interior, whether or not defined as controlled.
- C. Corrective Measures:

1. Correct any deficiencies in the mock-up observed during testing and repeat tests as may be required to show compliance with the specified performance standards and the Contract Documents. Resubmit any submittals affected by these corrections. Resubmit Shop Drawings with changes made to assemblies to successfully complete preconstruction testing.
2. Deficiencies requiring repair or modification to the mock-up shall mandate a complete retesting of the mock-up beginning with the specified Preliminary Test unless otherwise requested by the Architect. If compliance with the performance standards is not achieved after 2 complete retests the Contractor shall replace mock-up completely with revised construction and start testing from the beginning.
3. Incorporate corrective measures indicated by the test report into the final assemblies after review by the Architect.

D. Final Acceptance

1. Final Acceptance of the mock-up shall be done in writing. Successful testing results and the completed test report are required for this acceptance and completion of the balance of the respective assembly installation.

E. Disposal

1. When authorized by Architect in writing, demolish and remove all components of composite mockups from project site.
2. Mockup may be used as part of construction where indicated in the specification for that product.

END OF SECTION 01 43 39

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Work restrictions and limitations on utility interruptions.

1.03 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Owner, Architect, occupants of Project, testing agencies, or Authorities Having Jurisdiction.
- B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.04 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
 - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.

2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

1.05 QUALITY ASSURANCE

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

1.06 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized-steel bases for supporting posts.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

2.02 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, Construction Manager, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

TEMPORARY FACILITIES AND CONTROLS

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

2.03 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC as required in Section 01 77 00 - Closeout Procedures.
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 EXECUTION

3.01 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 01 10 00 "Summary."

- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Heating and Cooling: Provide temporary heating heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead unless otherwise indicated.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.03 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Provide temporary parking areas for construction personnel.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 - Construction Waste Management and Disposal.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 - Execution.

- I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- J. Temporary Elevator Use: See Section 142100 "Electric Traction Elevators" and as applicable for temporary use of new elevators when included in the Contract Documents.
- K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 01 10 00 "Summary."
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion and sedimentation control Drawings and requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

- E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accomodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.05 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard, replace, or clean stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use permanent HVAC system to control humidity.

3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.06 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves the right to take possession of Project identification signs.
 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 - Closeout Procedures.

END OF SECTION 01 50 00

SECTION 01 56 39
LANDSCAPE PROTECTION DURING CONSTRUCTION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction. The Contractor shall coordinate with the Owner's arborist in advance of any work affecting landscape and landscape protection during construction. The Owner will pay the arborist directly.

1.02 DEFINITIONS

- A. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

1.03 PREINSTALLATION MEETINGS

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

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.
- C. Samples: For each type of the following:
 - 1. Organic Mulch: Sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
 - 2. Protection-Zone Fencing: Assembled Samples.
- D. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1.05 INFORMATIONAL SUBMITTALS

- A. Certification: By Contractor, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- B. Maintenance Recommendations: To be obtained by Contractor from Owner's arborist, for care and protection of trees affected by construction during and after completing the Work.

- C. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

D. FIELD CONDITIONS

1. The following practices are prohibited within protection zones:
 - a. Storage of construction materials, debris, or excavated material.
 - b. Moving or parking vehicles or equipment.
 - c. Foot traffic.
 - d. Erection of sheds or structures.
 - e. Impoundment of water.
 - f. Excavation or other digging unless otherwise indicated.
 - g. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
2. Do not direct vehicle or equipment exhaust toward protection zones.
3. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Backfill Soil: Planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.
- B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 1. Type: Pine needle mulch.
 2. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:
 - a. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch (50-mm) maximum opening in pattern and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches (2400 mm) apart. High-visibility orange color.

- 1) Height: 60 inches (1200 mm).
- 2) Manufacturer: Sentry Diamond Mesh Safety Fence by TENAX, or approved equal.
- b. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.
3. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering.
4. Mycorrhizal Fungal Inoculate: Mycor Tree Saver, or approved equal, shall be used as per the manufacturer's directions.
5. Growth Regulator: Cambistat, or approved equal.
6. Termite Treatment: Premise by Bayer Corporation, or approved equal, shall be used according to manufacturer's instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. PREPARATION

1. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.02 PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people from easily entering protected areas except by entrance gates.
 1. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect.
- C. Maintain protection zones free of weeds and trash.

- D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

E. EXCAVATION

- 1. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.
- 2. Do not allow exposed roots to dry out before placing permanent backfill.

F. ROOT PRUNING

- 1. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:
 - a. The roots shall be pruned in accordance with generally accepted arboricultural practices.
 - b. The Contractor shall notify the Architect and Owner's arborist whenever trees or roots need to be pruned prior to beginning construction. All pruning is to be done under the supervision of the Owner's arborist.
- 2. Root Pruning at Edge of Protection Zone: Prune tree roots by cleanly cutting all roots to the depth of the required excavation.
- 3. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

G. CROWN PRUNING

- 1. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by the Owner's arborist.
 - a. Prune to remove only broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
 - b. Pruning Standards: Prune trees according to the National Arborist's Association "Pruning Standards for Shade Trees" and ANSI A300 (Part 1).
- 2. Cut branches with sharp pruning instruments; do not break or chop.
- 3. Do not paint or apply sealants to wounds.

H. REGRADING

1. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
2. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
3. Minor Fill within Protection Zone: Where existing grade is 2 inches (50 mm) or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

I. FIELD QUALITY CONTROL

1. Inspections: Engage the Owner's arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

J. REPAIR AND REPLACEMENT

1. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect and the Owner's arborist.
 - a. Perform repairs of damaged trunks, branches, and roots within 24 hours according to the Owner's arborist's written instructions.
 - b. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect and Owner's arborist.
2. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 2-inch (50-mm) uniform thickness to remain.

K. DISPOSAL OF SURPLUS AND WASTE MATERIALS

1. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 01 56 39 01 56 39

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This 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; product substitutions; and comparable products.
- B. Related sections include the following:
 - 1. Section 01 60 13 - Product Substitution Request Form: For substitution requests of comparable, equivalent or equal products prior to bid.
 - 2. Section 01 42 00 - REFERENCES: For applicable industry standards for products specified.
 - 3. 01 77 00 - CLOSEOUT PROCEDURES: For submitting warranties for contract closeout.
 - 4. Individual Product Sections: For specific requirements for warranties on products and installations specified to be warranted.

1.02 DEFINITIONS

- A. Products: Items purchased for incorporating into the work, whether purchased for project or taken from previously purchased stock. The term "product" includes the terms "materials", "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, except that products consisting of recycled content materials are allowed. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable or Similar & Equivalent Product (as approved by Architect): Product that is demonstrated and approved through the procurement substitution process to have the indicated qualities related to type, function, dimension, in service performance, physical properties, appearance, warranty, maintenance, and other characteristics that equal or exceed those of specified product.

- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis of design", including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, warranty, maintenance, and other characteristics for purposes of evaluating comparable products or other named manufacturers.
- C. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.03 SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
 - 1. Coordinate product list with Contractor's construction schedule and the submittals schedule.
 - 2. Form: Tabulate information for each product under the following column headings:
 - a. Specification section number and title
 - b. Generic name used in the Contract Documents
 - c. Proprietary name, model number, and similar designations
 - d. Manufacturer's name and address
 - e. Supplier's name and address
 - f. Installer's name and address
 - g. Project delivery date or time span of delivery period
 - h. Identification of items that require early submittal for scheduled delivery date
 - 3. Initial Submittal: Within thirty (30) days after date of commencement of the work, submit initial product list. Include a written explanation for omissions of data and for variations from contract requirements.

- a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established in the first third of contract time period.
4. Completed List: Within sixty (60) days after date of commencement of work, submit completed product list. Include a written explanation for omissions of data and for variations from contract requirements.
5. Architect's Action: Architect will respond in writing to Contractor within fifteen (15) days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.
- B. Comparable, Equivalent or Equal Product Requests: Submit request for consideration of each comparable, equivalent or equal product no later than seven (7) calendar days prior to bid or as indicated in Instructions to Bidders. Identify product or fabrication or installation method to be substituted. Include Specification Section number and title and drawing numbers and titles.
 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation. Architect will make notification of approval or rejection of proposed comparable product request within seven (7) calendar days of receipt of request.
 - a. Form for Submission: Section 01 60 13 - Product Substitution Request Form.
 - b. Method of Approval: Addendum
 - c. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 - Submittal Procedures. Show compliance with requirements.

1.04 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two (2) or more products or systems for use on project, product or system selected shall be compatible with products previously selected, even if previously selected products were also options.
 1. The Contractor is responsible for providing products and construction methods compatible with products and construction methods of the Contractor's work and his subcontractors' and vendors' work.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, the Architect will determine which products shall be used.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. 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 ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 5. Protect stored products from damage; and liquids from freezing.
 - 6. Provide a secure location and enclosure at project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.
 - 7. Store cementitious products and materials on elevated platforms.
 - 8. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

1.06 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: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the specifications, prepare a written document using appropriate form properly executed.
 3. Refer to individual specification sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 - Closeout Procedures.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected", Architect will make a selection. Contractor shall submit physical color charts, chips, or samples produced by the manufacturer or supplier as the Architect requires. Architect will not select colors from electronically transmitted or scanned color charts or chips.
 5. Where products are accompanied by the term "match sample", sample to be matched is Architect's. Contractor may request to view the Architect's sample before the date of bid. After execution of the construction contract, the contract sum or time will not be increased or extended, respectively, for the Contractor to match the Architect's sample.

6. Descriptive, performance, and reference standard requirements in the specifications establish “salient characteristics” of products.
7. Or Equal: Where products are specified by name and accompanied by the term “or equal” or “or approved equal” or “or approved,” comply with provisions in Part 2 “Comparable Products” article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Products: Where specifications include a list of names of both products and manufacturers, provide one of the products listed. Comply with provisions in Part 2 “Comparable Products” Article for consideration of an unnamed product.
2. Manufacturers: Where specifications include a list of manufacturers, provide a product by one of the manufacturers listed. Comply with provisions in Part 2 “Comparable Products” Article for consideration of an unnamed product.
3. Product Options: Where specifications indicate that sizes, profiles, and dimensional requirements on drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Document “Procurement Substitution Procedures” Article for consideration of an unnamed product or system.
4. Basis-of-Design Product: Where specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 “Comparable Products” Article for consideration of an unnamed product by the other named manufacturers.
5. Where no manufacturers or products are listed: Provide products by manufacturers that meet requirements of the Specification Section in which they are listed.
6. Visual Matching Specifications: Where specifications require matching an established sample, select a product that complies with requirements and matches Architect’s sample. Architect’s decision will be final on whether a proposed product matches.
 - a. If no product within specified category matches and complies with other specified requirements, comply with provisions in Part 2 “Product Substitutions” Article for proposal of product.
7. Visual Selection Specifications: Where specifications include the phrase “as selected from manufacturer’s colors, patterns, textures” or a similar phrase, select a product that complies with other specified requirements.
 - a. Standard Range: Where specifications include the phrase “standard range of colors, patterns, textures” or similar phrase, Architect will select color, pattern, density, or texture from manufacturer’s product line that does not include premium items.

- b. Full Range: Where specifications include the phrase “full range of colors, patterns, textures” or similar phrase, Architect will select color, pattern, density, or texture from manufacturer’s product line that includes both standard and premium items.

2.02 COMPARABLE PRODUCTS

- A. Conditions: Architect will only consider Contractor’s request for comparable product(s) prior to bid. The request for consideration of a comparable product must also meet the following requirements. If the following requirements are not satisfied, Architect will not return requests, except to record noncompliance with these requirements:
 1. Evidence that the proposed product does not require extensive revision to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the work.
 2. Detailed comparison of significant qualities of proposed product with those named in the specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty and maintenance characteristics.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Sample, if requested.

2.03 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than fifteen (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. Requested substitution provides sustainable design characteristics that specified product provided.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.

- e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. 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 60 (Sixty) 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. Requested substitution provides sustainable design characteristics that specified product provided .
 - e. Substitution request is fully documented and properly submitted.
 - f. Requested substitution will not adversely affect Contractor's construction schedule.
 - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - h. Requested substitution is compatible with other portions of the Work.
 - i. Requested substitution has been coordinated with other portions of the Work.
 - j. Requested substitution provides specified warranty.

- k. 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 - EXECUTION (NOT USED)

END OF SECTION 01 60 00

SECTION 01 60 13
PRODUCT SUBSTITUTION REQUEST FORM

THE PROJECT AND THE PARTIES

1.01 TO: _____

1.02 PROJECT: _____

1.03 SPECIFIED ITEM:

A. Section: _____

B. Page: _____

C. Paragraph: _____

D. Description: _____

1.04 PROPOSED SUBSTITUTION

A. The undersigned request consideration of the following:

1. _____

B. Attached data includes product description, specifications, drawings, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

C. Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

D. The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

1. The proposed substitution does not affect dimensions shown on Drawings.

2. The undersigned will pay for changes to the building design, including engineering design, detailing, and construction costs caused by the requested substitution.

3. The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.

4. Maintenance and service parts will be locally available for the proposed substitution.

E. The undersigned further states that the function, appearance and quality of the proposed substitution are equivalent or superior to the specified item.

1.05 SUBMITTED BY:

A. Signature: _____

EDR Project No. 23083
21 February 2025

1031 Annunciation
Permit and Pricing Set

B. Firm: _____

C. Date: _____

D. Email: _____

E. Attachments: _____

1.06 FOR USE BY ARCHITECT/ENGINEER:

☐ Approved ☐ Approved as Noted

☐ Not Approved ☐ Received too Late

By _____

Date _____

Remarks _____

END OF FORM

SECTION 01 61 16
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for Indoor-Emissions-Restricted products.
- B. Requirements for VOC-Content-Restricted products.

1.02 RELATED REQUIREMENTS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Section 01 40 00 - Quality Requirements: Procedures for testing and certifications.
- C. Section 01 60 00 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.03 DEFINITIONS

- A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Interior paints and coatings applied on site.
 - 2. Interior adhesives and sealants applied on site, including flooring adhesives.
 - 3. Flooring.
 - 4. Composite wood.
 - 5. Products making up wall and ceiling assemblies.
 - 6. Thermal and acoustical insulation.
 - 7. Other products when specifically stated in the specifications.
- B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
 - 1. Exterior and interior paints and coatings applied on site.
 - 2. Exterior and interior adhesives and sealants applied on site, including flooring adhesives.
 - 3. Wet-applied roofing and waterproofing.
 - 4. Other products when specifically stated in the specifications.
- C. Interior of Building: Anywhere inside the exterior weather barrier.

- D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.
- F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
 - 1. Stone.
 - 2. Concrete.
 - 3. Clay brick.
 - 4. Metals that are plated, anodized, or powder-coated.
 - 5. Glass.
 - 6. Ceramics.
 - 7. Solid wood flooring that is unfinished and untreated.

1.04 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2018).
- C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers; 2017, v1.2.
- D. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products; California Air Resources Board; current edition.
- E. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2020.
- F. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Current Edition.
- G. UL (GGG) - GREENGUARD Gold Certified Products; UL Environment; current listings at <http://http://productguide.ulenvironment.com/QuickSearch.aspx>.
- H. GreenSeal GS-36 - Standard for Adhesives for Commercial Use; 2013.
- I. SCAQMD 1113 - Architectural Coatings; 1977, with Amendment (2016).
- J. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2017).

K. SCS (CPD) - SCS Certified Products; Current Edition.

L. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

1.05 SUBMITTALS

A. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

1.06 QUALITY ASSURANCE

A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using Standard Private Office exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.

1. Wet-Applied Products: State amount applied in mass per surface area.

2. Paints and Coatings: Test tinted products, not just tinting bases.

3. Evidence of Compliance: Acceptable types of evidence are the following;

a. Current UL (GGG) certification.

b. Current SCS (CPD) Floorscore certification.

c. Current SCS (CPD) Indoor Advantage Gold certification.

d. Current CRI (GLP) certification.

e. Test report showing compliance and stating exposure scenario used.

4. Product data submittal showing VOC content is NOT acceptable evidence.

5. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.

B. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.

1. Evidence of Compliance: Acceptable types of evidence are:

a. Report of laboratory testing performed in accordance with requirements.

b. Published product data showing compliance with requirements.

c. Certification by manufacturer that product complies with requirements.

C. Composite Wood Emissions Standard: CARB (ATCM) for ultra-low emitting formaldehyde (ULEF) resins.

1. Evidence of Compliance: Acceptable types of evidence are:

- a. Current SCS "No Added Formaldehyde (NAF)" certification; www.scscertified.com.
 - b. Report of laboratory testing performed in accordance with requirements.
 - c. Published product data showing compliance with requirements.
 - d. Certification by manufacturer that product complies with requirements.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.
- B. Indoor-Emissions-Restricted Products: Comply with Indoor Emissions Standard and Test Method, except for:
 1. Composite Wood, Wood Fiber, and Wood Chip Products: Comply with Composite Wood Emissions Standard or contain no added formaldehyde resins.
 2. Inherently Non-Emitting Materials.
- C. VOC-Content-Restricted Products: VOC content not greater than required by the following:
 1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
 2. Aerosol Adhesives: GreenSeal GS-36.
 3. Joint Sealants: SCAQMD 1168 Rule.
 4. Paints and Coatings: Each color; most stringent of the following:
 - a. 40 CFR 59, Subpart D.
 - b. SCAQMD 1113 Rule.
 - c. CARB (SCM).
 5. Wet-Applied Roofing and Waterproofing: Comply with requirements for paints and coatings.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

- B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION 01 61 16

SECTION 01 73 00
EXECUTION

PART 1 - GENERAL

1.01 SUMMARY

- A. The section includes general procedural requirements governing execution of the work including, but limited to the following:
 - 1. Construction layout
 - 2. Field engineering and surveying
 - 3. General installation of products
 - 4. Coordination of Owner-installed equipment
 - 5. Progress cleaning
 - 6. Starting and adjusting
 - 7. Protection of installed construction
 - 8. Correction of the work
- B. Related Sections Include the Following:
 - 1. Section 01 31 00 - Project Management and Coordination for procedures for coordinating field engineering with other construction activities.
 - 2. Section 01 33 00 - Submittal Procedures for submitting for product approval.
 - 3. Section 01 40 00 - Quality Requirements.
 - 4. Section 01 73 29 - Cutting and Patching for procedural requirements for cutting and patching necessary for the installation or performance of other components of the work.
 - 5. Section 01 77 00 - Closeout Procedures for submitting final property survey with project record documents, recording of Owner accepted deviations from indicated lines and levels, and final cleaning.

1.02 SUBMITTALS

- A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- B. Final Property Survey: Submit five (5) copies showing the work performed and record survey data.

1.03 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in the jurisdiction where project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. At Notice to Proceed, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the work.
 - 1. Verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. At Notice to Proceed, investigate and verify the existence and location of underground utilities and other construction affecting the work.
 - 1. Verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services. Record information on record documents.
 - 2. Furnish location data for work related to project that must be performed by public utilities serving project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with installer or applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written report: Where a written report listing conditions detrimental to performance of the work is required by other sections, include the following:
 - a. Description of the work
 - b. List of detrimental conditions, including substrates
 - c. List of unacceptable installation tolerances
 - d. Recommended corrections
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. Existing Utilities Information: Furnish to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities have jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the work properly. Recheck measurements before installing each product. Where portions of the work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on drawings.
- D. Review of Contract Documents and Field Conditions: Immediately upon discovery of the need for clarification of the Contract Documents, submit a request for information to the Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.03 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the work, verify layout information shown on drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the work using accepted surveying practices.
 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of the project.
 2. Establish dimensions within tolerances indicated. Do not scale drawings to obtain required dimensions.
 3. Inform installers of lines and levels to which they must comply.
 4. Check the location, level and plumb, of every major element as the work progresses.

5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Owner.

3.04 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 2. Replace lost or destroyed permanent benchmarks and control points promptly. Based replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two (2) permanent benchmarks on project site, referenced to data established by survey and control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on project record documents.
 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the work.
 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

- D. Final Property Survey: Prepare a final property survey showing significant features (real property) for project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, street, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to legal point.
 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey".

3.05 INSTALLATION

- A. General: Locate the work and components of the work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved, templates for work specified to be factory prepared and field installed. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the work.
1. Mounting Heights: Where mounting height are not indicated, mount components at heights directed by Architect and Owner.
 2. Allow for building movement, including thermal expansion and contraction.

3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.06 OWNER-INSTALLED PRODUCTS (WHERE APPLICABLE)

- A. Site Access: Provide access to project site for Owner's construction forces.
- B. Coordination: Coordinate construction and operations of the work with work performed by Owner's construction forces.
 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner within two (2) weeks if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the work depend on Owner's construction.

3.07 PROGRESS CLEANING

- A. General: Clean project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold materials more than seven (7) days during normal weather or three (3) days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the work.
 1. Remove liquid spills promptly

2. Where dust would impair proper execution of the work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.08 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment. Include test reports in closeout procedures.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation. Comply with qualification requirements in Division 1 Section "Quality Requirements".

3.09 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed work is without damage or deterioration at time of Substantial Completion.

- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section 01 73 29 "Cutting and Patching".
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

SECTION 01 73 29
CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes procedural requirements for cutting and patching.
- B. Related sections include the following:
 - 1. Individual Product Sections: For specific requirements and limitations applicable to cutting and patching individual parts of the work.

1.02 DEFINITIONS

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

1.03 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least ten (10) days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to In-place Construction: Describe anticipated results. Include changes to structural elements and operating and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.

7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.04 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load carrying capacity or load-deflection ratio.
 1. Including but not limited to concrete slabs on grade, concrete walls, and steel bracing.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
 1. Primary operational systems and equipment
 2. Air or smoke barriers
 3. Fire-suppression systems
 4. Mechanical systems piping and ducts
 5. Control systems
 6. Communication systems
 7. Conveying systems
 8. Electrical wiring systems
 9. Operating systems of special construction in Division 13 sections (if applicable).
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
 1. Water, moisture, or vapor barriers
 2. Membranes and flashing
 3. Exterior curtain wall construction
 4. Equipment supports
 5. Piping, ductwork, vessels, and equipment
 6. Noising and vibration-control elements and systems

- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. Cutting and Patching Conference: Before proceeding, meet at project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.05 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Comply with requirements specified in other sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Temporary Support: Provide temporary support of work to be cut. Provide and submit professional engineered drawings and calculations for support of work to be cut that have been legally prepared and stamped by a licensed professional engineer registered in the state of the project and who is experienced in providing engineering services of the kind required.

- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of project that might be exposed during cutting and patching operations. Replace work that was damaged during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.03 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original installer; comply with original installer's written recommendations.
 - 1. In general use hand or small power tools designated for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and masonry: Cut using a cutting machine, such as an abrasive saw or a diamond –core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity on installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extended finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extended one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosures to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, glue, and similar materials.

END OF SECTION 01 73 29

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
 - 1. Aluminum and plastic beverage containers.
 - 2. Corrugated cardboard.
 - 3. Wood pallets.
 - 4. Clean dimensional wood.
 - 5. Concrete: May be crushed and used as riprap, aggregate, sub-base material, or fill.
 - 6. Bricks: May be used on project if whole, or crushed and used as landscape cover, sub-base material, or fill.
 - 7. Concrete masonry units: May be used on project if whole, or crushed and used as sub-base material or fill.
 - 8. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 9. Gypsum drywall and plaster.
 - 10. Plastic buckets.
 - 11. Carpet, carpet cushion, carpet tile, and carpet remnants, both new and removed: DuPont (<http://flooring.dupont.com>) and Interface (www.interfaceinc.com) conduct reclamation programs.
 - 12. Paint.
 - 13. Windows, doors, and door hardware.

- E. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- F. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
- G. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

- A. Section 01 33 00 - Submittal Procedures: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. Section 01 50 00 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.
- C. Section 01 60 00 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- D. Sections 01 73 00 - EXECUTION, 01 73 29 - CUTTING AND PATCHING, and 01 77 00 - CLOSEOUT PROCEDURES : Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

1.03 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

- A. See Section 01 10 00 for list of items to be salvaged from the existing building for relocation in project or for Owner.
- B. See Section 01 33 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- C. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.
- D. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.

- E. See Sections 01 73 00 - EXECUTION, 01 73 29 - CUTTING AND PATCHING, and 01 77 00 - CLOSEOUT PROCEDURES for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- C. Meetings: Discuss trash/waste management goals and issues at project meetings.
 - 1. Preconstruction meeting.
 - 2. Regular job-site meetings.
- D. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 - 1. As a minimum, provide:
 - a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
 - b. Separate dumpsters for each category of recyclable.
 - c. Recycling bins at worker lunch area.
 - 2. Provide containers as required.
 - 3. Provide temporary enclosures around piles of separated materials to be recycled or salvaged.
 - 4. Locate enclosures out of the way of construction traffic.
 - 5. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 - 6. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- E. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- F. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

- G. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- H. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION 01 74 19

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes administrative and procedural requirements for Contract closeout, including, but not limited to the following:
 - 1. Substantial Completion and Inspection
 - 2. Final Completion and Inspection
 - 3. Punch List
 - 4. Record Documents
 - 5. Warranties
 - 6. Final cleaning of building(s) and site.
- B. Related sections include the following:
 - 1. Individual Product Sections: Specific requirements for operation and maintenance data.
 - 2. Individual Product Sections: Warranties required for specific products or Work.
 - 3. Individual Product Sections: Specific closeout and special cleaning requirements for the work in those sections.
 - 4. Section 01 73 00 - Execution: For progress cleaning of project site.

1.02 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. Submit to the Architect in writing items below that are incomplete in request:
 - 1. Show 100 percent completion for the portion of the work claimed as substantially complete.
 - a. If 100 percent completion cannot be shown, prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.

3. Submit operation and maintenance manuals, workmanship bonds, maintenance service agreements and proposals, test reports, start-up performance reports, and similar documents.
 4. Obtain and submit releases permitting Owner unrestricted use of the work and access to services and utilities. Include occupancy permits, operating certificates, final mechanical and electrical inspections, and similar releases by authorities having jurisdiction, as applies.
 5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 6. Advise Owner's personnel of changeover in security provisions.
 7. Complete startup testing of systems.
 8. Terminate and remove temporary facilities from project site, along with mockups, construction tools, and similar elements.
 9. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 10. Complete final cleaning requirements, including touchup painting.
 11. Touchup and otherwise repair and restore marred exposed finishes to eliminate visual defects.
 12. Provide thirty (30) days written notice to the Owner of dates of changeover of electric, gas, water, TV/phone/data, and similar utilities.
 13. Provide proof of utility meter installation and request of transfer of utilities to the Owner, as applies.
 14. Provide final Testing, Adjustment and Balance reports. Preliminary reports are not acceptable.
 15. Perform final cleaning.
 16. Change locks and cores to provide Owner access and transmit keys, codes, and keying schedule to Owner.
 17. Submit final property survey (if applicable)
- B. Inspection: Submit a written request to the Architect for inspection for Substantial Completion. 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 Owner or Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.
3. The Architect will make one (1) reinspection visit to the site; additional site visits will be deducted from the unpaid funds remaining in the Contract Sum at the Architect's prevailing rate.

1.03 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of final completion, complete the following:
1. Submit a final application for payment according to Section 01 29 00 - Payment Procedures.
 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage comply with insurance requirements.
 4. Submit pest-control final inspection report and warranty
 5. Submit required warranties (and guarantees) and Maintenance Agreements.
 6. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 7. Prepare and submit record documents.
 8. Prepare and submit final completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
 9. Final progress photos.
 10. Removal of all surplus materials that will not be turned over to the Owner.
 11. Proof of completion of items specified in Substantial Completion.
 12. Proof of transmittal of required project construction records to the Owner.
 13. Removal of all temporary facilities and services.
 14. Proof of change of door locks to Owner's access and transmittal of keys, key schedule, combinations, etc.

15. Receipt for filing Substantial Completion.
 16. Receipt for filing Contract.
 17. Lien and Privilege certificates.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final certificate for payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
- C. Re-inspection:
1. Reinspection: Request reinspection when the work identified in previous inspections as incomplete is completed or corrected.
 2. The Architect will make one (1) reinspection visit to the site; additional site visits will be deducted from the unpaid funds remaining in the Contract Sum at the Architect's prevailing rate.

1.04 PUNCH LIST

- A. Preparation: The Contractor shall prepare a punch list for the project and submit to the Architect. Include name and identification of each space and area affected by construction operations for items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. The Contractor's punch list shall include photos and a description of the item(s). The location of photos within the project shall be easily identifiable in the punch list.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, special finishes, openings, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project Name
 - b. Date
 - c. Name of Architect
 - d. Name of Contractor
 - e. Page Number
 4. Work that has not started and incomplete work will not be reviewed by the Architect during creation of the Architect's punch list.

5. Include an itemized estimate of the cost to complete punchlist work.
6. Submit the punch list to the Architect no less than four (4) days before requesting the Architect to begin creation of the Architect's punch list. Requests for the Architect to create the Architect's punch list shall be in writing.
7. After initial creation of the Architect's punch list, the Architect will visit the site one (1) time to review corrected work. If work marked by the Contractor as "complete" is found not to be complete, the Architect may stop the field visit for the Contractor to re-review and complete the punch list. Additional site visits for the Architect to re-review completed punch list items will be deducted from the unpaid funds remaining in the Contract Sum at the Architect's prevailing rate.

1.05 RECORD DOCUMENTS

- A. Record Drawings: Provide one (1) reproducible set of paper Contract drawings and shop drawings. Also provide record Contract drawings and shop drawings, in color, on one (1) compact disc (CD) or USB thumb drive.
 1. During construction, provide periodic review documents recording work variations.
 2. Store record documents separate from documents used for construction.
 3. Record information concurrent with construction progress.
 4. Mark the set to show the actual installation where the installation varies from the work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where shop drawings are used, record a cross-reference at the corresponding location on the Contract drawings.
 5. Mark record sets to distinguish between variations in separate categories of the work.
 6. Note related change order numbers where applicable.
 7. Organize record drawing sheets into sets and bind with durable paper cover sheets. Mark as "RECORD DOCUMENTS" on the front sheet or cover.
 8. Ensure entries are complete and accurate, enabling future reference by Owner.
- B. Record Specifications: Provide one (1) reproducible paper copy of the Project Manual, including addenda, and one copy of other written construction documents such as ASIs, accepted WCPRs, change orders, and modifications issued in printed form during construction. Also provide these documents, in color, on one (1) compact disc (CD) or USB thumb drive. Note related record drawing information and product data.
 1. Record information concurrent with construction progress.
 2. Mark documentation to show variations in actual work performed in comparison with the text of the specifications and modifications.

3. Mark the manufacturer's name and product model and number of the product(s) or system installed. Include product substitutions or alternates utilized. Include changes made by addenda and other modifications during construction.
 4. Provide photographs of equipment and/or schedule of valve locations enclosed within walls or above ceilings.
 5. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Operation and Maintenance Manuals: Provide three (3) paper copies and an electronic copy of organized operation and maintenance data into sets, organized according to specification section numbers used in the Project Manual, with a table of contents and thumb tab index sheets. Bind indexed data in heavy-duty, 3-ring vinyl-covered, loose-leaf binders, with pocket folders for folded sheet information. Each operation and maintenance manual shall include one (1) copy of each final approved shop drawing in transparent pocket folders. Identify each binder on the front and spine with the typed title "OPERATION AND MAINTENANCE MANUAL", "PROJECT NAME, and "NAME OF CONTRACTOR". Include the following types of information:
1. For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
 2. Include product data, data sheets, and catalog information including size, color composition, and texture; identify specific products used in the work. Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
 3. Supplement product data with drawings to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use project Record Documents as maintenance drawings.
 4. Inspection, testing service, lubrication, and maintenance instructions and schedules.
 5. Operating instructions, including start-up and shutdown procedures. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
 6. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
 7. Emergency instructions, names, and phone numbers.
 8. Parts lists and local service organization.
 9. Signed warranties and guarantees required in the specifications.

10. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
 11. Test reports.
 12. Wiring and piping diagrams.
 13. Other information required by the specifications.
- D. Instruct Owner's personnel for up to three (3) hours in the use of operation and maintenance manuals.

1.06 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within fifteen (15) days of completion of designated portions of the work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Warranty Manuals: Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual. Provide one (1) original and two (2) copies of the warranty manual. Also provide these documents, in color, on one (1) compact disc (CD) or USB thumb drive. Provide manual as follows:
1. Bind warranties (and bonds, if applicable) in heavy-duty, 3-ring vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8 ½ x 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 title "WARRANTY MANUAL", "PROJECT NAME", and "NAME OF CONTRACTOR".
- D. Provide copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer of 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

3.01 FINAL CLEANING

- A. General: Provide 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 average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire project or for a portion of project:
 - a. Clean project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from project site.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.
 - h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Remove labels that are not permanent.

- k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - l. Do not paint over “UL” and similar labels, including mechanical, electrical, door, frame, hardware, shutter, and fire cabinet name plates.
 - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Cleans ducts, blowers, and coils if units were operated without filters during construction.
 - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave project clean and ready for occupancy
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner’s property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements.

1.02 RELATED REQUIREMENTS

- A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 10 00 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
- C. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- D. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- E. Section 01 73 00 - EXECUTION: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- F. Section 01 74 19 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022.

1.04 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
 - 1. Items which cannot be reinstalled immediately shall be stored on site and protected against construction activities, weather, temperature, and humidity.

2. The Contractor shall provide new items for the Project, with no increase in the Contract Sum and no extension of the Contract Time, where degradation of items caused by insufficient protection occurs during the storage period.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
- E. Refurbished Items: Existing items of construction that are not to be permanently removed, but are to be improved by cleaning, repairing, and refinishing to a like-new condition.
- F. Demolish: Same as Remove.

1.05 SUBMITTALS

- A. Site Plan: Indicate:
 1. Areas for temporary construction and field offices.
 2. Areas for temporary and permanent placement of removed materials.
 3. May be combined with Site Plan submittal in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS if required.
- B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property for environmental protection, for dust control, and for noise control. Indicate proposed locations and construction of barriers.
- C. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
 1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
 2. Demolition firm qualifications.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.06 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
 1. Minimum of 5 years of experience.
- B. Predemolition Conference: Conduct conference at Project site.
 1. Inspect and discuss condition of construction to be selectively demolished.
 2. Review structural load limitations of existing structure.

3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 DEMOLITION

- A. Remove paving and curbs required to accomplish new work.
- B. Within area of new construction, remove foundation walls and footings to a minimum of 2 feet below finished grade except where structural elements are designated as existing to remain.
- C. Remove concrete slabs on grade within site boundaries.
- D. Remove other items indicated, for salvage and recycling.
- E. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 1. Obtain required permits.
 2. Comply with applicable requirements of NFPA 241.
 3. Use of explosives is not permitted.
 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 5. Provide, erect, and maintain temporary barriers and security devices.
 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.

8. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
 9. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
 10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Do not begin removal until built elements to be salvaged or relocated have been removed.
- D. Do not begin removal until vegetation to be relocated has been removed and vegetation to remain has been protected from damage.
- E. Protect existing structures and other elements to remain in place and not removed.
1. Provide bracing and shoring.
 2. Prevent movement or settlement of adjacent structures.
 3. Stop work immediately if adjacent structures appear to be in danger.
- F. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- G. Hazardous Materials:
1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.
- H. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Comply with requirements of Section 01 74 19 - Construction Waste Management and Disposal.
 2. Dismantle existing construction and separate materials.
 3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
- I. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.

- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone. Identify and mark, in same manner as other utilities to remain, utilities to be reconnected.

3.04 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove materials not to be reused on site; comply with requirements of Section 01 74 19 - Waste Management.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 02 41 00

SECTION 03 04 00
CUSTOM PRECAST CONCRETE

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. Perform all work required to furnish and complete the proper installation of precast concrete.
- B. Precast Concrete components:
 - 1. Precast Concrete Steps
 - 2. Precast Concrete Pavers
 - 3. Precast Concrete Pool Coping
 - 4. Precast Wall Cap
 - 5. Precast Concrete Wing Wall
 - 6. Setting material, grouts, sealants and caulks
 - 7. Installation of precast concrete
- C. Related Sections:
 - 1. Division 1: Administrative, procedural, and temporary work requirements.
 - 2. Section 033101 – Cast in Place Concrete for Landscape

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C-150
 - 2. ASTM C-128
 - 3. ASTM C-260
 - 4. ASTM C-31
 - 5. ASTM C-494
 - 6. ASTM C-39
- B. Precast Concrete Institute (PCI)

1.4 SUBMITTALS

- A. Shop Drawings
 - 1. Submit fabrication drawings of all precast concrete items showing detailed sections and profile for all precast items. Details shall show all reinforcing and cast in hardware.
- B. Samples
 - 1. Submit 1 sample for color and texture approval.
 - a. Color to be selected from manufacturer's standard offerings.
 - b. Match existing or architect's sample
 - c. Custom Sample Number
- C. Submit a copy of manufacturer's Quality Assurance and Procedure Manual
- D. Performance Requirements

1. Compressive Strength 5,000 p.s.i. minimum
2. Air Content 6-8%
3. Water-Cement Ration .45
4. Deflection Max: L/720
- E. Test Results
 1. Manufacturer shall furnish test results attesting that materials meet specification requirements.

1.5 QUALITY ASSURANCE

- A. Qualifications: Precast Concrete Manufacturer and Trade Contractor must have a minimum of 5 years of successful experience on projects of similar magnitude and complexity to the indicated project.
- B. Manufacturer and contractor to be prequalified by Architect prior to bidding and failure to do so will void bid.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging and Shipping: precast concrete to be palletized, shrink wrapped and marked with legible manufacturer identification, including piece number and quantities.
- B. Storage and Protection precast concrete to be stored in secure area in original packaging.
- C. Protect from damage by other trades.
- D. Report all damage due to shipment immediately. Customer is required to sign the Bill of Lading slip detailing the damaged product. Picture proof is required.

1.7 WARRANTY

- A. For a period of two (2) years from delivery of precast concrete, manufacturer warrants the precast concrete products against defects in workmanship and materials per industry standards. This warranty does not cover the above products for cracking and faulting caused by settling due to improper or faulty substrates or improper installation; nor does it cover damage caused by impact, vandalism or natural disaster.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Atelier Vals (Basis of Design)
 1. Todd Hart
4500 Bowling Blvd, Ste 100
Louisville, KY 40207
502-498-0840
www.ateliervals.design
- B. Architectural PreCast
 1. Gary Whitehead
2187 Beaumont Drive
Baton Rouge, LA 70806
225-229-7669
www.batonrougeprecast.com
- C. Approved Equal

2.2 MATERIAL REQUIREMENTS

- A. Portland Cement: ASTM C-150 Specifications for Portland Cement.
- B. Aggregates: Aggregate shall be blended to meet individual project requirements.
- C. Coloring; Pigments used shall be inorganic, resistant to alkalinity and used per manufacturer's recommendations.
- D. Reinforcement and Hardware:
 - 1. Reinforce precast with deformed rods as recommended by precast concrete manufacturer.
- E. Abrasive Inserts: Shall consist of silica sand and epoxy.
 - 1. Abrasive Color:
 - 2. Specify one to three lines.
- F. Setting Materials, Caulks & Sealants
 - 1. Color(s) to be selected by Architect.
 - 2. Sealer: Colorless, pure acrylic water repellent sealer. Sealer to maintain natural look of concrete surface with no glaze or gloss, darkening or color change.
 - 3. Precast manufacturer is not a reseller for any of the above products. Please contact the following supplier for information and recommendations on job specific installation materials:
 - a. Acceptable Supplier:
Custom Building Products/Aqua Mix, 800-272-878
E-mail: info@cbpmail.net Website: www.custombuildingproducts.com

2.3 MANUFACTURED UNITS

- A. Sizing Tolerances
 - 1. All units to conform to shop drawings with a (+/-) 1/8" tolerance in dimension.
- B. Precast Surfaces and Edges:
 - 1. All exposed edges to have minimum of 1/8" radius to prevent chipping.
 - 2. All finished surfaces to match approved control sample.
 - 3. All precast concrete finished surfaces to be factory sealed.
- C. Finishing
 - 1. Pavers: Thermal finish on all exposed horizontal and vertical surfaces
 - 2. All other Precast units: Smooth Finish
- D. Sizes:
 - 1. Pavers: 12" x 18" x 2" thick
 - 2. Steps: Sizes per drawings
 - 3. Wall Units: Sizes per drawings.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine substrates for the following:
 - 1. Defects or cracks in existing work or substrate.
 - 2. Deviations beyond allowable tolerances for the substrate.
- B. Continue with installation of precast units only when all defects have been corrected.

3.2 PROJECT CONDITIONS

- A. Do not install products under environmental conditions outside setting material manufacturer's absolute limits.

3.3 INSTALLATION

- A. Precast Tread setting methods include
 - 1. Thin Set Application
 - a. Substrate of concrete or steel (steel at interior application only). Must be within a tolerance of 1/8" in all dimensions.
 - b. Latex modified thin set mortar used over concrete substrate.
 - 1) Setting bed must be continuous under the entire length of the tread and behind the entire riser. Setting materials utilized per manufacture's recommended instruction.
 - c. Epoxy thin set is used over steel substrate.
 - 1) Setting bed must be continuous under the entire length of the tread and behind the entire riser. Setting materials utilized per manufacture's recommended instruction.
 - d. Set treads level and plumb to meet finished nosing layout.
 - 2. Mortar Set Application
 - a. Substrate of concrete or steel (steel at interior application only). Must be within a tolerance of 1/8" in all dimensions.
 - b. The height of the mortar bed is established based on tread nosing layout marks and precast thickness. The mortar bed is then placed or screeded over primed substrate.
 - 1) Setting bed must be continuous under the entire length of the tread and behind the entire riser. Setting materials utilized per manufacture's recommended instruction.
 - c. Set treads level and plumb to meet finished nosing layout.
 - 3. Tab Set Application
 - a. Substrate of concrete or steel (steel at interior application only) must be within a tolerance of 1/8" in all dimensions.
 - b. Tabs to be set at front and back of tread every 12" O.C. minimum.
 - c. Set treads level and plumb to established nosing layout.
- B. Joints
 - 1. Joints between adjacent precast should be a minimum of 1/8"-1/4".
- C. Caulking of Precast
 - 1. Clean all joints thoroughly, removing all debris.
 - 2. Wipe all joints with caulk manufacturer's recommended cleaner prior to application.
 - 3. Use urethane caulk. (Color match caulk to precast per architect selection.)
 - 4. Clean up after caulking as per caulk manufacturer's recommendations.
- D. Precast Concrete products setting or installation methods are to be reviewed by the manufacturer and setting materials supplier.
- E. Final Cleaning of Precast Concrete
 - 1. Check all surfaces and caulking, make repairs as necessary.
 - 2. Clean treads with a pH balanced soap.
- F. Protection:
 - 1. Upon completion, the work shall be ready for final inspection and acceptance by owner or owner's agent.

2. General Contractor shall protect the finished work from the time the installing contractor completes the work.
- G. Finish:
 1. Overall match to approved sample and per industry standards.
 2. All products to be factory sealed.

3.4 CARE AND MAINTENANCE

A. Cleaning

1. To preserve the appearance and extend the life of the Precast Concrete cleaning and maintenance processes must be in place. When using the following procedures, please follow the product manufacturer's instructions regarding the use of any equipment or cleaning materials described here.
 - a. Power sweep, then pressure wash precast surface. Spot clean any stained areas.
 - b. Spot clean any stained areas by using a neutral, non-aggressive cleaner. This may require effort to remove some of the tougher marks or stains.
 - 1) Example of off-the-shelf cleaners: Citrus cleaner, Simple Green
 - c. Always start with the most neutral cleaner and work your way toward the more aggressive cleaners.
 - d. In extreme cases, contact Wausau Tile to discuss options
 - e. Be sure to use plastic, rubber or nylon tip equipment; this will help prevent scratches on the concrete.
2. Precast Concrete is built to withstand aggressive cleaning; however, the more aggressive the cleaner, the more risk is involved. Strict adherence to all product warnings is suggested.
3. In all cases after cleaning and/or patching, it is recommended that the Precast be sealed. This will help protect the product from environmental effects. Contact manufacturer to obtain sealer and stain information based on specific job.

B. Maintenance

1. Annual maintenance is recommended; however, in cases of extreme use, the best time for application is when the appearance of the product is showing wear or is appearing dull.
2. Check the precast for broken and chipped pieces. If damaged, contact manufacturer before repairing to order a patch kit and obtain patching procedures.
3. De-icing salts can damage concrete, causing them to scale or break apart. If necessary, these chemicals should be used sparingly and with caution on our concrete products.
 - a. Salt based products are not recommended
4. De-icers should be used only when necessary to help loosen snow and ice, and make removal easier. Never over-apply de-icing products. Mix the de-icers with sand to increase their effectiveness and reduce overall use.
 - a. Always read and follow label directions when applying de-icing materials.
 - b. Calcium magnesium acetate chloride tends to cause the least amount of damage to Precast Concrete
5. Other manufacturer's products used in conjunction with the Precast Concrete may require additional maintenance. Including but not limited to: Wood, Metals, Plastics, etc. Contact product specific manufacturers for their maintenance requirements.

END OF SECTION 03 04 00

SECTION 03 10 01
CONCRETE FORMWORK FOR LANDSCAPE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes furnishing and installing formwork for cast-in-place concrete shown on the Landscape Drawings, with shoring, bracing, anchorage and all necessary accessories. Openings in the formwork for other work shall be provided. All stripping activities shall be included under this section.
 - 1. Cast Stone Step Base
 - 2. Concrete footings shown on Landscape Drawings
 - 3. Any other cast-in-place concrete elements shown on Landscape Drawings(excluding paving)
- B. Related Requirements:
 - 1. Section 032001 – “Concrete Reinforcement for Landscape”
 - 2. Section 033101 – “Cast-in-Place Concrete for Landscape”
 - 3. Section 321313 – “Concrete Paving for Landscape”

1.03 REFERENCES

- A. ACI 347-78 - Recommended Practice for Concrete Formwork.
- B. ACI 301-84 - Specifications for Structural Concrete for Building (Revised 1988).
- C. PS-1 - Construction and Industrial Plywood.
- D. ACI 318-95/318R-95 - Building Code Requirements for Reinforced Concrete.

1.04 DESIGN REQUIREMENTS

- A. CONTRACTOR shall be responsible for the design, engineering and construction of formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension. Design and construction of formwork shall take into account live loads, dead loads, weight of moving equipment operating on formwork, concrete mix, height of concrete drop, vibrator frequency, temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to the safety of personnel and structures. CONTRACTOR shall provide shores, struts, and trussed supports as necessary.

1.05 QUALITY ASSURANCE

- A. Work shall be performed in accordance with the standards referenced in Part 1.3 of this specification.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for design, fabrication, erection and removal of formwork.

1.07 COORDINATION

- A. Coordinate this section with other sections of the Work which require attachment of components to formwork. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, replace formwork or reset reinforcing to provide minimum specified concrete cover.

PART 2 - PRODUCTS

2.01 WOOD FORM MATERIALS

- A. Forms for exposed vertical faces less than 30" in height: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize joints
 - 1. Coated plywood consisting of a plywood panel core that is pre-coated with a smooth phenolic film or smooth fiberglass surface on one side.
 - a. Coated plywood forms may be reused as long as no surface damage is present. If surface damage is present, including cuts, chips, or any other inconsistency compromising the contiguous smooth surface, the form shall be discarded and replaced.
- B. Forms for exposed vertical faces greater than 30" in height:
 - 1. Preformed Steel Forms: Minimum 16-gauge (1.5 mm) matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
 - 2. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- C. Forms for paving, sidewalks, and other horizontal concrete applications
 - 1. See Section 321313 – Concrete Paving.

2.02 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16-gauge (1.5 mm) matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

2.03 FORMWORK ACCESSORIES

A. Form Ties:

1. Metal form ties shall be removable or snap-off type, galvanized metal, fixed or adjustable length cone type with waterproof washer (for water bearing structure or basement), shall be used to hold forms in place. Such ties shall have provision to permit ease of removal of the metal as hereinafter specified. The use of wire form ties will not be permitted. All metal appliances used inside of the forms to hold them in correct alignment shall be removed to a depth of at least 1/2-inch from the surface of the concrete and shall be so constructed that metal may be removed without undue injury to the surface from chipping or spalling. Such devices, when removed, shall leave a smooth opening in the concrete surface not larger than 7/8-inch in diameter. Burning off of rods, bolts, or ties will not be permitted. Metal ties shall be held in place by devices attached to wales. Each device shall be capable of developing the strength of the tie. Metal and wooden spreaders which are separate from the forms shall be wired to the top of form and shall be entirely removed as the concrete is being placed. The use of metal form ties of a type that are encased in paper or other material to allow the removal of complete tie, leaving a hole through the concrete structure, will not be permitted in the construction of basement or water bearing walls. After the tie rods are broken back or removed, the holes shall be thoroughly cleaned to remove all grease and loose particles; then the mortar (non-shrink cement-sand mortar, as dry as practicable) shall be carefully placed into the holes in small quantities. After the holes are completely filled, all excess mortar shall be struck off flush and the surface finished in such a manner as to render the filled hole as inconspicuous as possible. If these patches appear to be darker than the other surface of the concrete, white cement shall be used in the mortar as required.
2. "Supertie" fiberglass form tie system as manufactured by RJD Industries, Inc., 26945 Cabot Road, Suite 107, Leguna Hill, California, 800/344-4753. Provide spreader rod, ties, gripper and all necessary accessories and installation devices. Provide gray color rod. Install Supertie in accordance with supplier's instructions. After removal of forms, grind Supertie flush to wall.

- B. Form Release Agent: Colorless mineral oil which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete.

- C. Corners: Chamfered, rigid plastic or wood strip type; 3/4-inch by 3/4-inch size; maximum possible lengths. Accurately formed to produce uniformly straight lines and tight edge joints.

- D. Nails, Spikes, Lag bolts, Through bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

E. Waterstops:

1. Resilient Type - Polyvinyl chloride, minimum 2,000 psi tensile strength, minimum 50°F (15°C) working temperature range, 9-inch wide for construction joints, 9-inch wide for expansion joints, maximum possible lengths, ribbed profile, preformed corner sections,

- heat welded jointing; "Wire Stop" as manufactured by Paul Murphy Plastic Co. or approved equivalent.
2. Soft Type - Blend of refined hydrocarbons, resins, plasticizing compounds and mineral fillers extruded in a 5/8-inch by 1-1/2-inch ribbon, which is a soft, pliable adhesive. Compound does not cure, oxidize or evaporate. Waterstop shall be: As manufactured by Synko-flex, 2100 Travis, Houston, Texas 77002, 713/686-8203; Swellseal Plus as manufactured by de neef America, Inc., 122 North Mill Street, St. Louis, Missouri 48880, 517/681-5791; or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Plans.

3.02 EARTH FORMS

- A. Earth forms shall not be used without specific, written approval from ENGINEER. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.03 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with the requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval from ENGINEER before framing openings in structural members which are not indicated on Plans.
- F. Provide chamfer strips on external corners of beams, joists, columns, elevated slabs and walls.

3.04 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS AND EMBEDDED PARTS

- A. Provide form openings where required for items to be embedded in or passing through concrete work. Locate and set in place items which will be cast directly into concrete.

3.06 FORM CLEANING

- A. Clean and remove foreign matter within forms as erection proceeds.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts or water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

- A. Construct formwork so as to maintain tolerances required by ACI 347, Chapter 3.3, except as otherwise noted.

3.08 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure. Do not reuse split, frayed, delaminated or otherwise damaged formwork.

3.09 FORM REMOVAL

- A. The time for removal of forms shall comply with ACI 318. If curing temperatures are below 50°F (15°C), the time for removal shall be increased by fifty percent (50%). In no case shall forms or bracing be removed until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION 03 10 01

SECTION 03 11 16
ARCHITECTURAL CAST-IN-PLACE CONCRETE FORM LINERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Form liners for architectural concrete with a textured finish as indicated on Drawings.

1.02 RELATED SECTIONS

- A. Section 03 30 00 - Cast in Place Concrete: General Requirements and Form-facing panels to which form liners are to be attached.

1.03 REFERENCES

- A. ACI 117 - Tolerances for Concrete Construction and Materials.
- B. American Concrete Institute (ACI): ACI 347R-14 - Guide to Form work for Concrete.
- C. ASTM D 624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
- D. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
- E. ASTM D 648 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
- F. ASTM D 695 - Standard Test Method for Compressive Properties of Rigid Plastics.
- G. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- H. ASTM D 792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- I. ASTM D 1525 - Standard Test Method for Vicat Softening Temperature of Plastics.
- J. ASTM D 2240 - Standard Test Method for Rubber Property Durometer Hardness, Shore A; A Scale Test.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Printed product data and installation guidelines for formliner system.
 - 2. Manufacturer's installation instructions, showing required preparation and installation procedures.
 - 3. Storage and handling requirements and recommendations.

4. Installation methods.
 5. Cleaning and maintenance instructions.
- B. Shop Drawings: Submit formwork panel elevations, detailing the location of architectural concrete work, including but not limited to the following:
1. Shop drawings showing the placement of Concrete Form Liners which are to be coordinated and incorporated with the shop drawings submitted per the requirements of Section 03 30 00 - Cast-in-Place Concrete.
 2. Concrete form liners specified to produce a wood plank finish in the cast finish as shown in the shop drawings with clarity and clear indication of how the specialty form liners are attached to the "structural" form panels.
 3. Coordinate the thickness of the form liner with the requirements in Section 03 30 00 - Cast in Place Concrete.
- C. Form tie locations, end locations and other special conditions, panel sizes, joint locations, joint widths, reveal and false-joint locations and dimensions, elevations, sections and details of assembly components, attachment details, and weather sealing; indicate locations, configurations, typical details, connections, expansion joints, large scale plans.
1. Show sequence of installation.
 2. Show location of members, other items of work and related work of other Sections to be coordinated with work of this section.
 3. Submit detail drawings depicting proper installation and flashing techniques. Coordinate locations with those found on the Contract Drawings.
- D. Quality Assurance Submittals: Copies of test reports by independent laboratories verifying the performance of the system shall be submitted to the Architect upon request.

1.05 QUALITY ASSURANCE

- A. Single Source Requirements: Provide primary and secondary components required for installation of formliner systems shall be components of system recommended by single source.
- B. Manufacturer Qualifications: Minimum 5 years experience manufacturing similar products.
- C. Installer Qualifications:
1. Experienced and competent in architectural concrete installation with a minimum of 5 years experience.
 2. Installer directly employed by the Cast-in-Place Concrete Installer and in accordance with the requirements of Section 03 30 00 - Cast-in-Place Concrete paragraph 1.04.E.

3. If requested, submit a list of recently completed projects using similar materials.
- D. Textured Concrete Mock-Ups: Provide mock-ups for evaluation of surface preparation techniques and application workmanship.
1. The mock-up shall demonstrate workmanship to be expected in completed work.
 2. Locate mock-up on site in location as directed by Architect. Clean the sample panel installation using the same materials and tools as planned for the final construction.
 3. Obtain Architect's acceptance of mock-up before start of work.
 4. Do not proceed with remaining work until workmanship, colors, styles, patterns, and textures are approved by Architect.
 5. Incorporate edge, reveal, and detail as per drawings.
 6. Include an area to demonstrate formliner butt joint and continuation of pattern through construction joint.
 7. Show clean, pressure washed concrete surface.
 8. Maintain Mock Up for comparison with finished work.
 9. Remove mock-up at the completion of the work.
 10. Provide mockup: Typical vertical wall, sized 4'-0" high by 4'-0" high by 12 inches deep, showing a return of the pattern on both edges of the mockup.
- E. Conduct a pre-installation meeting to verify all products, application procedures, site conditions and warranty terms. Conduct in accordance with Section 01 31 00 - Project Management and Coordination.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered to the location in unopened factory containers. Upon arrival, materials shall be inspected for damage and manufacturer informed of any discrepancies. Deficient materials shall not be used.
- B. Materials shall be stored in a protected location and safeguarded from damage.
- C. Store formliners and PFS plywood covered and elevated off the exposed ground. Prolonged high or low temperatures will cause a permanent distortion and deterioration of physical properties.
- D. Protect liquid materials from freezing temperatures and temperatures in excess of 90 degrees F (32 degrees C). Store covered, out of direct sunlight.

1.07 COORDINATION/SCHEDULING

- A. Coordinate installation of formliner panel systems with column and ceiling elements, including, louvers, ducts, flashings, sealants, sealant tapes and membranes, supporting wall framing, surface mounted objects, etc.
 - 1. Coordinate with installation of flashing, coping and sealants to ensure that materials are installed in accordance with manufacturer's instructions.
 - 2. Coordinate with installation of surface mounted fixtures to ensure that materials are installed in accordance with manufacturer's instructions and the fixtures have a consistent smooth surface to attach to with only “board textured” surfaces adjacent.

PART 2 - PRODUCTS

2.01 FORM LINER MANUFACTURERS

- A. Basis-of-Design Manufacturer: Customrock Formliners (www.customrock.com).
 - 1. Product: Custom Formliner No. 6004; 4-inch wide rustic wood plank.

2.02 PERFORMANCE REQUIREMENTS

- A. Shore A Hardness ASTM D 2240: 60-70.
- B. Tear Strength, ASTM D 624: PLI 140-160.
- C. Ultimate Elongation, ASTM D 638 (ASTM D 412): 280-330 percent.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates are within manufacturer's specified tolerances and have been prepared in accordance with manufacturer's instructions.
- B. If substrate preparation is the responsibility of another installer, do not proceed with installation. Notify Architect of unsatisfactory preparation immediately. Commencement of full installation represents acceptance of existing substrate conditions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's written instructions as applicable to each type of substrate required. Install in accordance with specified pattern and mortar.
- B. For “plank textured” form lines, prepare, install, and finish in accordance with current release of Manufacturer’s Application Guideline for the particular type of formliner used.

- C. Tolerances: Dimensions of the finished panel, at the time of erection in the structure, shall conform to the tolerances for precast, non-prestressed elements in ACI 117, unless otherwise specified by the Architect.
- D. Form liners shall be installed at the following locations as indicated on the documents:
 - 1. Ground Floor Colaboration Space.
 - 2. Form liner shall be used on columns, beams and walls indicated to have a cast-in-place finish.
 - a. Columns are to have “plank” pattern match at each corner and to start with a “full” horizontal “plank width” at the base of the column, with the patterning continuing seamlessly from the bottom to the top of the column.

3.03 CLEANING AND PROTECTION

- A. Cleaning: As recommended by manufacturer. Do not begin cleaning until mortar joints are properly cured. Allow a minimum of 24 to 72 hours. Soak mortar joints before applying cleaner.
 - 1. Thoroughly flush wall and are after cleaning.
 - 2. Clean adjacent materials and surfaces of all foreign materials resulting from the work of this Section.
- B. Protection:
 - 1. Protect installed materials from water impinging on the visible surface, chinking, sealants joints, and from behind.
 - 2. Protect installed materials from dust, dirt, precipitation, freezing, damaged, spilled materials, and continuous high humidity until they are fully dry.

END OF SECTION 03 11 16

SECTION 03 20 01
CONCRETE REINFORCEMENT FOR LANDSCAPE

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

- A. Section Includes the following items shown in the Landscape Drawings:
 - 1. Cast stone step base
 - 2. Concrete footings shown on Landscape Drawings
 - 3. Any other cast-in-place concrete elements shown on Landscape Drawings(excluding paving)
- B. Related Requirements:
 - 1. Section 031001 "Concrete Formwork for Landscape"
 - 2. Section 033101 "Cast-in-Place Concrete for Landscape"

1.03 REFERENCES

- A. ACI 301-84 - Structural Concrete for Buildings (Revised 1988).
- B. ACI 318-95/318R-95 - Building Code Requirements For Reinforced Concrete.
- C. ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures.
- D. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
- E. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- F. SP-66-88 - ACI Detailing Manual.
- G. ANSI/ASTM A496 - Deformed Steel Wire Fabric for Concrete Reinforcement.
- H. ANSI/ASTM A497 - Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
- I. ANSI/AWS D1.4 - Structural Welding Code for Reinforcing Steel.
- J. ANSI/AWS D12.1 - Reinforcing Steel Welding Code.
- K. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- L. CRSI - Concrete Reinforcing Steel Institute Manual of Practice.
- M. CRSI 63 - Recommended Practice For Placing Reinforcing Bars.
- N. CRSI 65 -Recommended Practice For Placing Bar Supports, Specifications and Nomenclature

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.05 INFORMATIONAL SUBMITTALS

- A. Submittals shall meet the requirements of Section 013400, Contractor's Submittals.
- B. Record Data: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel, bending and cutting schedules, supporting and spacing devices, and joint and splice locations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Comply with ACI 315, Chapters 1 through 8.
- E. Manufacturer's specifications and installation instructions for all proprietary products, including sleeves for welded splices..

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with referenced standards. Submit certified copies of mill test report of reinforcement materials analysis.

1.07 COORDINATION

- A. Coordinate work with other trades, placement of formwork, formed openings and other work.

PART 2 - PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Bars: Deformed, new billet steel conforming to ASTM A615, Grade 60 for nonweldable bars and ASTM A706, Grade 60 for weldable bars. Grade 60 shall be used for concrete paving.
- B. Welded Wire Fabric: ASTM A185 for smooth wire and ASTM A457 for deformed wire.

2.02 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16-gauge annealed type.
- B. Supports for Reinforcement: Conform to CRSI 63.
- C. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent settling or vapor barrier puncture.
- D. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel or stainless steel type, size and shape as required.
- E. Splices

1. Mechanical Connections:
 - a. Compression: Gateway Building Products "G-Loc" or approved equivalent.
 - b. Tension: Lenton Anchor or approved equivalent. Connection device shall develop 125 percent of yield strength of bar.
2. Welded Splices: "Cadweld," "Thermoweld" or approved equivalent. Size device to develop 125 percent of yield strength of bar.
3. Lap Splices: See structural drawings.

2.03 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice. Locate reinforcing splices not indicated on Plans at point of minimum stress. Review location of splices with ENGINEER.

PART 3 - EXECUTION

3.01 PLACEMENT

- A. Place, support and secure reinforcement against displacement by means of accepted spacers, chairs or hangers. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Conform to AC1 318 code for concrete cover over reinforcement. Concrete surfaces in contact with liquids shall have 2-inch cover.
- E. Clean reinforcement to remove loose rust, mill scale, oil, earth, ice, and other materials which might reduce or destroy bond with concrete.

3.02 FIELD QUALITY CONTROL

- A. Concrete shall not be placed until reinforcing steel is inspected by OWNER's Representative. All concrete placed in violation of this provision will be rejected. The CONTRACTOR shall give OWNER's Representative 48 hours notice prior to completion of reinforcement placement.

END OF SECTION 03 20 01

SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Scope: The work to be done under this section of the specifications includes all labor, materials, equipment, and services necessary for cast-in-place concrete including formwork, reinforcing, mix design, placement procedures, finishes, as indicated on drawings and herein specified.

1.3 CAST-IN-PLACE CONCRETE: Includes the following:

- A. Foundations and footings.
- B. Slabs-on-grade.
- C. Columns, Girders, Beams and Elevated Slabs.
- D. Foundation walls.
- E. Equipment pads and bases.
 - 1. Include all concrete pads and supports for mechanical and electrical equipment where indicated. Unless otherwise shown, these pads shall include concrete of the size required to support the equipment purchased and 500 lbs. of reinforcing steel per cubic yard of concrete.

1.4 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others if requested by Architect.
- C. Shop drawings for reinforcement detailing fabricating, bending, and placing concrete reinforcement. Comply with ACI 315R "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures. Reproductions made from contract documents will not be allowed. Submit one (1) electronic print for review and comment. The Engineer will have up to ten (10) working days from the time of receipt of the submittal to complete his review and return the submittal to the Architect. Review of shop drawings by the Architect/Engineer will be for

general compliance with contract documents. No responsibility will be assumed for correctness of dimensions, and quantities.

- D. Samples of materials as requested by Architect, including names, sources, and descriptions.
- E. Laboratory test reports for concrete materials and mix design test.
- F. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete."
 - 2. ACI 318, "Building Code Requirements for Structural Concrete," current edition.
 - 3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice," current edition.
- B. Concrete Testing Service: The Owner will employ a testing agency to perform material evaluation tests and to review concrete mix designs for compliance with the Contract Documents.
 - 1. The testing lab shall be in compliance with ASTM E 329 "Standard Specification for Agencies Engaged in Construction Inspection and/or Testing" and ASTM C 1077 "Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation".
 - 2. The testing laboratory shall submit a certificate of accreditation and the scope of accreditation that indicates compliance with the above standards.
- C. Materials and installed work may require testing and retesting at any time during progress of Work. Retesting of rejected materials for installed Work shall be done at Contractor's expense.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.

- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.
- E. Board Formed Concrete
 - a. General: Board-formed concrete shall be used where indicated on the drawings to achieve a wood-grain texture on the concrete surface. Refer to 03 11 16 in the Architectural Specifications for detailed aesthetic requirements.
 - b. Form Materials: Use natural wood boards or approved wood-textured form liners, free from defects, to produce the specified texture. Ensure consistent board alignment and tight installation to prevent leakage and misalignment.
 - c. Form Release Agent: Apply a compatible release agent per Section 2.1.C that will not affect the final texture or appearance.
 - d. Coordination: Aesthetic details are specified in Architectural Specifications. Verify compliance with both structural and architectural requirements before work begins.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60.
- B. Steel Wire: ASTM A1064, plain, cold-drawn steel.
- C. Welded Wire Fabric: ASTM A 1064, welded steel wire fabric. Flat sheets only. Rolls are not permitted.
- D. Deformed-Steel Welded Wire Fabric: ASTM A1064.
- E. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.
 - 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1).

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II.
 - 1. Use one brand of cement throughout Project unless otherwise acceptable to Architect.
- B. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.
 - 1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
 - 2. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.
- C. Lightweight Aggregates: ASTM C 330.
- D. Water: Potable.
- E. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- G. Water-Reducing Admixture: ASTM C 494, Type A.
- H. High-Range Water-Reducing Admixture: ASTM C 494, Type approved by Architect.
- I. Water-Reducing, Accelerating Admixture: ASTM C 494, Type C or E.
- J. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.

2.4 RELATED MATERIALS

- A. Vapor Barrier: 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
 - 3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1
 - 4. Warranty: (a) compliance with the designated ASTM E1745 classification, and (b) no

- manufacturing defects in the product for, at least, the Life of the Building.
5. Basis of design product shall be “Stego Wrap Vapor Barrier (15-mil)” by Stego Industries LLC. Other approved products include “Vaporguard” by Reef Industries, “PMPC” by WR Meadows.
 6. The following accessory products shall be by the approved vapor barrier product manufacturer and as required per manufacturer instructions to achieve the vapor barrier system warranty. Accessory products by manufacturers other than the approved vapor barrier manufacturer are not allowed:
 - a. Seam tape
 - b. Penetration mastic and tape
 - c. Perimeter/terminated edge seal tape and bar
 - d. Penetration prevention products
 - e. Vapor barrier-safe screed system
- B. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- C. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
1. Waterproof paper.
 2. Polyethylene film.
 3. Polyethylene-coated burlap.
- D. Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq. ft./gal.
1. Provide material that has a maximum volatile organic compound (VOC) rating of 350 g per liter.
- E. Water-Based Acrylic Membrane Curing Compound: ASTM C 309, Type I, Class B.
- F. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
- G. Underlayment Compound: Free-flowing, self-leveling, pumpable, cement-based compound for applications from 1 inch thick to feathered edges.
- H. Bonding Agent: Polyvinyl acetate or acrylic base.
- I. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.
- J. Waterstops: Volclay RX-101RH by CETCO or approved equal.

2.5 PROPORTIONING AND DESIGNING MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an

independent testing agency acceptable to Architect for preparing and reporting proposed mix designs. The independent testing agency shall review and approve the proposed mix design.

- B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been submitted to Architect.
- C. Design mixes to provide normal weight concrete or light weight concrete with the 28-day compressive strength as indicated on drawings.
- D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. Not more than 4 inches.
- E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work.

2.6 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 40 deg F (10 deg C) and falling.
- C. Waterproofing Admixture: Xypex Admix C-500 or Xypex Admix C-1000 as determined by curing conditions on the day of concrete placement, or an approved equal from an alternate product manufacturer. Refer to manufacturer's written instructions and specifications for admixing and placement procedures. Waterproofing admixture shall be added to concrete batches scheduled for placement at the elevator pit. Refer to drawings for locations.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.
 - 1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes. Ice can be added to concrete so that delivery time can remain at 1-1/2 hours.

PART 3 EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS

- A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 117 and ACI 347 limits:
 - 1. Provide Class A tolerances for concrete surfaces exposed to view.
 - 2. Provide Class C tolerances for other concrete surfaces.
 - 3. Provide
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.
- D. Formwork for Grade Beams and Pile Caps: Provide vertical formwork at the perimeter of grade beams and pile caps. Contractor shall install formwork as described here-in to ensure plumbness of cast vertical surfaces.
- E. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- F. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

- G. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR RETARDER/BARRIER INSTALLATION

- A. Install vapor barrier in accordance ASTM E1643.
 - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
 - 2. Vapor barrier shall be neatly placed. Follow the profile of the bottom of the slab and beams and be in intimate contact with the fill. Stop at impediments such as piles, dowels, and waterstops.
 - 3. If arranging placement of vapor barrier perimeter/edge seals prior to placement of concrete, seal vapor barrier to scheduled wet-cast slab perimeter/edge using Manufacturer's recommended adhesive product designed for this use, and remove dirt, debris, and mud from this adhesive product prior to concrete placement.
 - 4. Seal vapor barrier to footing/grade beam with double sided tape, termination bar, or both.
 - 5. Overlap joints 6 inches and seal with manufacturer's tape.
 - 6. Apply tape to a clean and dry vapor barrier.
 - 7. Seal all penetrations (including pipes) per manufacturer's instructions.
 - 8. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
 - 9. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all sides with tape.
 - 10. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the slab itself using Stego Crete Claw Tape, per manufacturer's instructions.
 - 11. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.

3.4 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
 - 1. Avoiding cutting or puncturing vapor retarder/barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.

- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
 - 1. Install only flat sheets. Rolls are not permitted.
- F. Where not specifically detailed on the drawings, support slab top reinforcing bars with continuous #4 reinforcing bars. Slab top reinforcing bars less than 6 feet in length shall have two support bars and slab top reinforcing bars greater than 6 feet in length shall have support bars spaced at no more than 3'-0" o.c. These bars shall be equally spaced along the length of the slab top reinforcing bars.

3.5 JOINTS

- A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.
- B. Provide keyways as indicated on drawings or at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.
- C. Provide waterstops at all construction joints in areas indicated on the drawings.
- D. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.
- E. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

3.6 INSTALLING EMBEDDED ITEMS

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.7 PREPARING FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
 - 1. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
 - 2. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.8 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. General: Comply with ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
 - 1. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to

set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

- D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 3. Maintain reinforcing in proper position on chairs during concrete placement.
 4. Floor Slab Tolerance: Floor finish tolerances of floor slabs shall conform to the requirements of the specified finish floor manufacturers, and in accordance with ACI 117 and ASTM E 1155 Standard Method for Determining Floor Flatness and Levelness using the F-Number System. Specified Overall Finish floor tolerances shall meet the requirements of "flat" as described in ACI 117, unless a more stringent tolerance is required by a finish floor installation. Specified overall and minimum (SOF_L and MLF_L) levelness tolerances shall apply only to level slabs-on-ground, or to level suspended slabs that are shored when tested. Refer to flooring specifications for additional concrete substrate flatness and levelness requirements.
- E. Cold-Weather Placement: Comply with provisions of ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- F. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305.1 and as specified.
1. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces to be exposed to view, covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections. These projections shall be

completely removed and smoothed. Repair all other surface defects in accordance with Concrete Surface Repairs, as specified herein.

- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces.

3.10 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, Portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
 - 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.
 - 1. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance.
- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
- E. Nonslip Broom Finish: Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.12 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
 - 1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- B. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.
 - 1. Provide moisture curing by the following methods:
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Use continuous water-fog spray.
 - c. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.
 - 2. Provide moisture-retaining cover curing as follows:
 - a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and Curb as follows:
 - a. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - b. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- C. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- D. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.
1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.13 REMOVING FORMS

- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Comply with ACI 301-10, Chapter 2, Article 2.3.3 – Reshoring and Backshoring.

3.14 REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable. Apply new form-coating compound as specified for new formwork.

- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable.

3.15 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.
- B. Mix dry-pack mortar, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
 - 1. Cut out honeycombs, rock pockets, voids, and holes left by tie rods and bolts down to Solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
 - 2. For surfaces exposed to view, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
 - 1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
 - 1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
 - 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 - 3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish

- repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The Owner will employ a testing agency to perform tests and to submit test reports.
- B. Sampling and testing for quality control during concrete placement shall include the following, as directed by Architect.
 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 2. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 3. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 5. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 7. Field testing the concrete density by ASTM C138.
- C. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
- D. Test results will be reported in writing to Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, slump, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- F. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 03 30 00

SECTION 03 31 01
CAST IN PLACE CONCRETE FOR LANDSCAPE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Cast Stone Step Base
 - 2. Concrete footings shown on Landscape Drawings
 - 3. Any other cast-in-place concrete elements shown on Landscape Drawings(excluding paving)
- B. Related Sections:
 - 1. Section 031001 "Concrete Formwork for Landscape"
 - 2. Section 032001 "Concrete Reinforcement for Landscape"

1.03 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.04 REFERENCES

- A. ACI 301-84 - Structural Concrete for Buildings (Revised 1988).
- B. ACI 302 - Guide for Concrete Floor and Slab Construction.
- C. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- D. ACI 305R - Hot Weather Concreting.
- E. ACI 306R - Cold Weather Concreting.
- F. ACI 308 - Standard Practice for Curing Concrete.
- G. ACI 318-95/318-95R - Building Code Requirements for Reinforced Concrete.
- H. ANSI/ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- I. ASTM C33-86 - Concrete Aggregates.
- J. ASTM C94-86 - Ready-Mixed Concrete.
- K. ASTM C595-21 – Blended Hydraulic Cement.
- L. ASTM C260-86 - Air Entraining Admixtures for Concrete.

- M. ASTM C494 - Chemical Admixtures for Concrete.

1.05 SUBMITTALS

- A. Submit under provisions of Section 013300.
- B. Product Data: Provide data on joint devices, attachment accessories, curing compounds, admixtures, mix designs, tests performed to establish mix designs, and physical capacity of mixing plant and trucking facilities.
- C. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent work

1.06 PROJECT RECORD DOCUMENTS

- A. Submit under the provisions of the GENERAL CONDITIONS. Accurately record actual locations of embedded utilities and components which are concealed from view.
- B. CONTRACTOR shall furnish delivery tickets with each load of concrete delivered indicating amount or weights of each component in the load, the cubic yards in the load, the amount of water which may be added in the field without exceeding the specifications, the time batched, and truck number. Ticket shall be printed and legible.

1.07 QUALITY ASSURANCE

- A. All work shall be performed in accordance with the standards referenced in Part 1.4. Cement and aggregate shall be obtained from the same source for all work.
- B. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to concrete placement, including but not limited to, the following:
 - a. Concrete mixture design.
 - b. Quality control of concrete materials and concrete paving construction practices.
 - 2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:

1.08 COORDINATION

- A. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Concrete paving subcontractor.

1.09 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Blended Hydraulic Cement: ASTM C 595, light gray, Type I/II.
- B. Fine and Coarse Aggregates: ASTM C33.
 - 1. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces.
 - 2. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances. Dune sand, bank run sand and manufactured sand are not acceptable.
 - 3. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
 - a. Crushed stone, processed from natural rock or stone in primarily brown and tan colors.
 - b. Wash gravel, either natural or crushed. Use of slag and pit or bank run gravel is not permitted.
 - c. Coarse Aggregate Size: Size to be ASTM C33, Nos. 57 or 67, except that No. 467 may be used for footings, foundation mats and walls 16 inches or greater in thickness.
- C. Water: Clean and not detrimental to concrete.

2.02 ADMIXTURES

- A. Air Entrainment: ASTM C260; MB-VR manufactured by Master Builders Company or approved equivalent.
- B. Chemical: ASTM C494, Type A - Water Reducing Pozzoloth manufactured by Master Builders Company or approved equivalent.
- C. Set-Control Admixtures: ASTM C494, as follows:
 - 1. Type B, Retarding.
 - 2. Type C, Accelerating.
 - 3. Type D, Water-reducing and Retarding.
 - 4. Type E, Water-reducing and Accelerating.
 - 5. Type F, Water-reducing, High Range.

2.03 ACCESSORIES

- A. Bonding Agent: Sika-Dur Hi-Mod manufactured by Sika Chemical Corporation or approved equivalent.
- B. Non-Shrink Grout: Submit product for approval under provisions of Section 013300.
- C. Reinforcing doweling system for existing concrete shall conform to Section 032001 and shall be installed per the manufacturer's instructions.

2.04 EXPANSIOIN JOINTS

- A. Provide a semi-rigid, closed-cell polypropylene foam, preformed joint filler that meets the following physical property requirements and fully complies with ASTM D8139.
- | | | |
|---------------------------|------------------|--------------------------------------|
| 1. Compression Strength | 30-60 psi | per ASTM D 545 or AASHTO T 42 |
| 2. Compression Recovery | > 80% | per ASTM D 545 or AASHTO T 42 |
| 3. Extrusion | < 0.1 in. | per ASTM D 545 or AASHTO T 42 |
| 4. Density | >3.5 lbs./cu.ft. | per ASTM D 545 or AASHTO T 42 |
| 5. Water Absorption | < 1.0% | per ASTM D 545 or AASHTO T 42 |
| 6. Heat Resistance °F | 392°F± 5°F | per ASTM D 5249 |
| 7. Freeze Thaw Resistance | No change | per ASTM C 666 (300 cycles) |
| 8. UV Weathering | No change | per ASTM D 4329 (1000 hrs., Cycle A) |
| 9. Thickness | 3/8" Min. | |
| 10. Width | 6" Min. | |
- B. Manufacturers
1. Nomaco, WR Meadows, or Approved Equal

2.05 CONCRETE MIX

- A. Provide concrete with the following mix design limitations where Class "A" concrete is specified (or where no Class is specified) to result in concrete placed in the field of minimum compressive strength of 4000 psi at 28 days based on test cylinders which are taken during concrete placement.

<u>Unit</u>	<u>Measurement</u>
Minimum Compressive Strength (7 day)	3000 psi
Minimum Compressive Strength (28 day)	4000psi
Coarse Aggregate	ASTM C33, No. 57
Fine Aggregate	ASTM C33
Water/Cement Ratio (maximum)	0.44 by weight
Air Entrainment	5 percent (+/- 2%)
Slump - Plus or minus 1 inch	4 inches
Minimum Cement Content	564 pounds per cy

- B. The concrete mix design listed above for the various classes shall be proportioned to produce 28 days concrete compression strength above the specified 28 days concrete compression strength when cylinder test is made from concrete mixed and moisture cured in the laboratory as follows:

<u>Specified 28 days strength</u>	<u>Laboratory 28 days test cylinder</u>
fc = 3000 psi and under	fc + 1000 psi
fc = 4000 to 5000 psi	fc + 1200 psi

Adjustment in the limitation listed in mix design shall be made to produce the required strength of laboratory made and cured cylinder.

- C. Use accelerating admixtures in cold weather only when approved by LANDSCAPE ARCHITECT. Use of admixtures will not relax cold weather placement requirements.

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- D. Do not use calcium chloride in concrete or in any admixture.
- E. Use set retarding admixtures during hot weather only when approved by LANDSCAPE ARCHITECT.
- F. Use air entraining agent in all concrete mix except for interior slabs subject to abrasion or unless otherwise shown.
- G. Maximum chloride ion content for corrosion protection shall meet Table 4.4.1 listed in ACI 318/318R (1995). Testing for chloride ion content shall conform to AASHTO T260.

2.06 COATINGS

- A. Penetrating Sealer: Transparent, non-yellowing, water- or solvent-based coating
 - 1. Composition: Silane-siloxane mixture
 - 2. Manufacturers:
 - a. Clemons Concrete Coatings
 - b. Concrete Sealers USA
 - c. TK Products Construction Coatings
 - d. WR Meadows
 - 3. Apply to exposed surfaces of retaining walls and steps per manufacturer's installation instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify site conditions prior to construction.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.02 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is to be doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with epoxy adhesive, unless capsule anchors or other form of fastening is shown on Plans.

3.03 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 117 and ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.

2. Class B & C, 1/2 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete, unless otherwise indicated.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.04 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 1. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.05 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Do not continue reinforcement through sides of strip placements of floors and slabs (unless noted otherwise on drawings).
 - 2. Form joints as indicated on drawings. Do not use metal keyways
 - 3. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces, where indicated on drawings.
 - 5. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces, where indicated on drawings.
 - 6. Construction joints shall not be placed in any slab areas with floor coverings prone to cracking, unless written approval is provided the Architect. When construction joints are allowed in slab areas with floor coverings prone to cracking, the contractor shall assure that joints are properly considered in floor covering installation as required to prevent reflective cracking.
- C. Doweled Joints (as indicated on drawings): Install dowel bars and support assemblies at joints where indicated.

3.06 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.
 - 1. Place at locations indicated on plans.
 - 2. Place at concrete construction joints below site grade in order to avoid water intrusion into interior space.
 - a. Place at wall to slab (or mat foundation) joints below site grade.
 - b. Place at wall to wall joints below site grade.

3.07 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304.
- B. Notify OWNER's representative 48 hours prior to completion of reinforcement placement.
- C. Prior to placing concrete, ensure that reinforcement, inserts, embedded parts, formed joint fillers, joint devices and water stops are not disturbed during concrete placement.
- D. Install joint fillers, primer and sealant in accordance with manufacturer's instructions.
- E. Separate slabs on grade from vertical surfaces with 3/4-inch thick joint filler where shown on the Plans.
- F. Extend joint filler from bottom of slab to within 1/4 inch of the finished slab surface. Conform to Section 079200 for finish joint sealer requirements.

- G. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 and in accordance with ASTM C94.
 - 1. Determine initial slump prior to any water addition at Project site and before any significant concrete discharge.
 - 2. Measure and record water added on Project site and resulting slump.
 - 3. The amount of water added shall not exceed the amount allowed in the approved design mixture.
 - 4. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
 - 5. Do not exceed specified W/C ratio or slump per approved design mixture.
 - 6. Do not add water to concrete delivered in equipment not acceptable for mixing.
 - 7. Do not add water if more than 0.25 cubic yards of concrete has already been discharged from the mixer.
 - 8. All water added shall be under the pressure and direction of flow required to achieve uniformity in concrete. Immediately after addition of water, the drum or blades of the truck mixer or agitator shall be turned an additional 30 revolutions or more if necessary, at mixing speed, until uniformity of concrete is achieved.
- H. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- I. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- J. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not place concrete when temperature is 36 deg F or below or if temperature is expected to reach 36 deg F (or below) within 12 hours of the anticipated time for completing a concrete pour.
 3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- K. Hot-Weather Placement: Comply with ACI 301, ACI 305R, and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- L. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
1. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- M. Place concrete continuously between predetermined expansion, control, and construction joints.
- N. Do not interrupt successive placement; do not permit cold joints to occur.
- O. Screed floors and slabs on grade level to required level, maintaining surface flatness of maximum 1/4-inch in 10 ft.

3.08 FINISHING FORMED SURFACES

- A. Concrete Finish Schedule
1. Retaining Walls
 - a. Exposed Top: Smooth Trowel
 - b. Exposed Vertical Face: Smooth-Formed
 - c. Non-Exposed Vertical Face: Rough-Formed
 2. Steps
 - a. Exposed Top: Light Broom
 - b. Exposed Vertical Faces: Smooth-Formed
 3. Curbs
 - a. Exposed Top: Medium Broom
 - b. Exposed Vertical Faces: Medium Broom
- B. Smooth-Formed Finish: (For formed vertical concrete surfaces exposed to view) As-cast concrete texture imparted by the specified form-facing material noted in Section 031000, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view
 2. Apply to concrete surfaces specified to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- C. Rough-Formed Finish: (For formed vertical concrete surfaces not exposed to view) As-cast concrete texture imparted by form-facing material with tie holes and defects repaired

and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.
- D. Rubbed Finishes: Where concrete surfaces are noted to receive a rubbed finish, consult with Landscape Architect to determine the type of rubbed finish prior to pouring of concrete. Apply one of the following to smooth-formed finished as-cast concrete as indicated or directed by Landscape Architect:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- E. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces indicated, to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- F. Smooth Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings.
- G. Broom Finish: Provide a light broom finish on all exposed surfaces on curbs when not noted to receive a specific finish listed above. Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
- H. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.09 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and

ACI 301 for hot- weather protection during curing.

- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

3.10 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints, unless noted otherwise in documents. Overfill joint and trim joint filler flush with top of joint after hardening.

3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Landscape Architect. Remove and replace concrete that cannot be repaired and patched to Landscape Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Landscape Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according

- to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Landscape Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.12 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed in accordance with ACI 301 and under the provisions of the General Conditions.
- B. CONTRACTOR shall provide free access to the Work and cooperate with the appointed testing firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
- D. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- E. Four concrete test cylinders will be taken for every 75 or less cubic yards of each class of concrete placed.
 1. When multiple trucks are used in a given day, evenly distribute the test cylinders between the number of trucks being used for that day.
- F. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. One slump test will be taken for each set of test cylinders taken.
- H. One air content test for each load of concrete at point of discharge or when indication of change requires.

- I. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C 143/C 143M; one test at point of discharge for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change or is questionable.
 - a. Determine initial slump prior to any water addition to concrete at Project site and before any significant concrete discharge.
 - b. Measure and record water added to concrete on Project site and resulting slump.
 - c. Record amount of water indicated on batch ticket allowed to be added.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 6. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure five standard cylinder specimens for each composite sample.
 - b. Testing Agency shall be responsible for providing curing container for composite samples on Site as required for initial curing period and verifying that standard-cured composite samples are cured in accordance with ASTM C31/C31M. Testing Agency shall document method of initial curing.
 - c. The Contractor shall provide secured space, electrical power, and access for initial curing of test specimens.
 7. Compressive-Strength Tests: ASTM C 39/C 39M.
 - a. Test one specimen at 7 days, three specimens at 28 days, and hold one specimen for testing at 56 days, if necessary.
 - b. A compressive-strength test shall be the average compressive strength from a set of three specimens obtained from same composite sample and tested at age indicated.
 8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work

(illustrated via highlighting of elements on structural plans), design compressive strength at 28 days, concrete mixture proportions and materials, concrete unit weight, compressive breaking strength, and type of break for both 7- and 28-day tests. Deviations from the requirements of the Contract Documents shall be clearly identified and described on the reports.

10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

3.13 SCHEDULE - CONCRETE TYPES

- A. Class "A" concrete shall be steel reinforced and shall include the following:
 1. Walls
 2. Slabs.
 3. Street paving.
 4. Girders.
 5. Columns.
 6. Drilled piers.
 7. Thrust blocks.
 8. Footings
- B. Class "B" concrete shall be placed without forms or with simple forms, with little or no reinforcing, and shall include the following:
 1. Equipment bases.
 2. Standard pipe supports (except thrust blocks).
 3. Fence post footings.
 4. Manhole bases.
 5. Pipe encasements.
- C. Class "C" concrete shall be placed with or without forms and shall be unreinforced. It is intended for use in the following applications:
 1. Concrete fill.
 2. Working slab.

3.14 MODIFICATION AND REPAIR TO EXISTING CONCRETE

- A. Cut, repair, reuse, demolish, excavate or otherwise modify parts of the existing structures or appurtenances, as indicated on the Contract Drawings, specified, or necessary to permit completion of the work. Finishes, joints, reinforcements, sealants, etc. are specified under respective sections of Specification. All work shall conform with other requirements of this Section and to detail Drawings.

B. Mix proportions of materials used in the modifications and repair to existing concrete as indicated on the Drawings shall be:

1. When new material other than non-shrink grout is shown to be connected to existing concrete, add the following cement mixtures depending on the depths called for or shown on the Drawings:

- a. Less than or equal to 2 inches in depth.

<u>Material</u>	<u>Volume</u>
Cement	1.0
Sand	2.0
Water	5 gals/200 lbs. cement

- b. Greater than 2 inches to 12 inches in depth.

<u>Material</u>	<u>Volume</u>
Cement	1.0
Pea Gravel	2.5
Sand	2.0
Water	5 gals/200 lbs. cement

- c. Greater than 12 inches in depth.

<u>Material</u>	<u>Volume</u>
Concrete as specified under 2.1	2.0
MATERIALS in this section	

2. Epoxy Bonding Agent

- a. Epoxy bonding agent shall be a two component epoxy adhesive specifically formulated for bonding old concrete to new (plastic) concrete. Component A shall be an epoxy resin and Component B shall be epoxy hardener. The epoxy bonding agent shall be "Sikastix 370, Sikdatur Hi-Mod", by Sika Corporation, Lindhurst, New Jersey; "Pro Bond 821 or 822" by Protex Industries, Denver, Colorado; "Concresive 1170" by Adhesive Engineering Company, San Carlos, California; or equal.
- b. The mixing ratio shall be as recommended by the manufacturer for the ambient temperature when placed. Furnish manufacturer's specific instruction for specific job application and obtain LANDSCAPE ARCHITECT's review prior to purchase.
- c. Epoxy bonding agent shall conform to ASTM C-881 and corresponding tests for bond strength and shrinkage as specified in ASTM C-882, C-883, and C-884.
- d. The properties of the cured material shall meet the following:
- 1) Compressive Strength (ASTMD-695)
48hour - 1000 psi
28day - 7000 psi
 - 2) Tensile Strength (ASTM D-638)
7 day - 4000 psi
 - 3) Bond Strength (ASTM C-882 or C-884) - 1500 psi
- e. Approval requirements - The CONTRACTOR must furnish notarized certification that the material proposed for use meets all of the above requirements and that the material has been previously used successfully for the purpose described.

3. Epoxy Protectant - Sikagard 62 by Sika Chemical Corporation, Lindhurst, New Jersey, or equal.
- C. Demolition of Existing Concrete shown to be removed on the Drawings shall be done by Sawcutting at limits of concrete as indicated on the Drawings. The CONTRACTOR shall be responsible for removing concrete in such a manner that surrounding concrete or existing reinforcing to be left in place and existing in place equipment is not damaged.
- D. Connection to Existing Concrete
 1. Roughen surface of existing concrete to be connected to new materials by sand-blasting, chipping, or scarifying. Thoroughly clean area of concrete to receive new materials of loose particles and dust or other contaminating objects.
 2. Existing reinforcing to be left in place as shown on the Drawings shall be wire brushed to remove rust or concrete on the bar. The existing reinforcing shall be cut, bent, lapped, or welded to new reinforcing as shown on the Drawings and provided with a minimum of 1 inch of cover all around and at ends of the bar. The reinforcing shall be thoroughly cleaned of loose particles and dust before incorporating in new materials.
 3. After existing concrete surface has been roughened and cleaned as specified above, apply epoxy bonding agent at connection surface. The field preparation and application of the epoxy bonding agent shall conform strictly with the manufacturer's recommendations. Immediately pour new cement mixture or non-shrink grout as detailed on the Drawings.

END OF SECTION 03 31 01

SECTION 03 35 11
CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface treatments for concrete floors and slabs.
- B. Liquid densifiers and hardeners.
- C. Clear coatings.
- D. Clear penetrating sealers.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Curing compounds that also function as sealers.
- B. Section 03 35 43 - Polished Concrete.
- C. Section 09 05 61 - Common Work Results for Flooring Preparation: Preparation of concrete floors to receive applied finishes.

1.03 POLISHED CONCRETE DEFINITIONS

- A. See CPC Definition Paper DEF-PC-100 dated June 2, 2012 for the definitions of the finished polish reflective clarity.
- B. See Section 03 35 43 for Polished Concrete.

1.04 REFERENCE STANDARDS

- A. Concrete Polishing Council (CPC), A Specialty Council of the American Society of Concrete Contractors - Polished Concrete - Definition - DEF-PC-100 dated June 2, 2012.
- B. American Concrete Institute (CSI) Document 310R-13 - Guide to Decorative Concrete (Adopted 2014).

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with concrete floor placement and concrete floor curing.

1.06 SUBMITTALS

- A. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- B. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

- C. Warranty Documentation: Manufacturer warranty; ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.08 FIELD CONDITIONS

- A. Do not finish floors until interior heating system is operational.
- B. Maintain ambient temperature of 50 degrees F minimum.

1.09 WARRANTY

- A. Correct defective work within a two-year period commencing on the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 CONCRETE FLOOR FINISH APPLICATIONS

- A. Unless otherwise indicated, all concrete floors indicated on the Finish Schedule to have Sealed Concrete are to be finished using penetrating sealer.
- B. Liquid Densifier and Hardener:
 - 1. Use at following locations: Exposed concrete floors indicated on the Finish Schedule as Sealed Concrete SC-1.
- C. Penetrating Clear Sealer:
 - 1. Use at following locations: Exposed concrete floors indicated on the Finish Schedule as Sealed Concrete SC-1.
- D. Clear Coating:
 - 1. Use at following locations: Exposed concrete floors indicated on the Finish Schedule as Polished Concrete SC-1.
- E. Polished Finish:
 - 1. Use at following locations: Exposed concrete floors indicated on the Finish Schedule as Polished Concrete PC-1. See Section 03 35 43

2.02 DENSIFIERS AND HARDENERS

- A. Liquid Densifier and Hardener: Penetrating chemical compound that reacts with concrete, filling the pores, hardening, and dustproofing.
 - 1. Composition: Lithium silicate.

2. VOC: 0 g/L maximum in accordance with SCAQMD Rule 1113, 2004.
3. Only apply concrete polish treatment compatible with the concrete liquid densifier applied as part of the polished concrete system.
 - a. Only use products for concrete finishing systems from one Manufacturer and per that Manufacturer's written recommendations.
4. Products:
 - a. Advanced Floor Products, Inc.; Retro-Plate 99: www.retroplatesystem.com
 - b. L&M Construction Chemicals, Inc, a subsidiary of Laticrete International, Inc; LiON HARD: www.lmcc.com/#sle.
 - c. PROSOCO, Inc; Consolideck LS: www.prosoco.com/consolideck/#sle.
 - d. W. R. Meadows, Inc; Liqui-Hard Ultra: www.wrmeadows.com/#sle.

2.03 COATINGS

- A. Clear Coating: Clear coating recommended by polished concrete manufacturer for finishing concrete floors and slabs.
 1. Gloss: As indicated in Polished Concrete System section..
- B. Penetrating Sealer: Transparent, nonyellowing, water- or solvent-based coating.
 1. Composition: Silane-siloxane mixture.
 2. Manufacturers:
 - a. Same as liquid densifier and hardener.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

- A. Prepare concrete surfaces in accordance with the recommendations of the ACI Document 310R-13 - Guide to Decorative Concrete.
- B. Apply materials in accordance with manufacturer's instructions and written specifications.

3.03 SURFACE TREATMENT APPLICATION

- A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by treatment manufacturer.
- C. Protect adjacent non-treatment areas from drips, overflow, and overspray; immediately remove excess material.
- D. Apply surface treatments in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

END OF SECTION 03 35 11

SECTION 04 20 00
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Mortar and grout.
- C. Reinforcement and anchorage.
- D. Flashings.
- E. Lintels.
- F. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 04 01 00 - Maintenance of Masonry.
- B. Section 07 21 00 - Thermal Insulation: Insulation for masonry unit cores.
- C. Section 07 25 00 - Weather Barriers: Water-resistive barriers applied to exterior face of unit masonry substrate.
- D. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.
- E. Section 09 03 00 - Conservation Treatment of Period Finishes: Flat plaster parge coat application.
- F. Section 09 24 00 - Cement Plastering: Parge coat materials.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2022.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- D. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.
- E. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2016, with Editorial Revision (2018).

- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a.
- G. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2022.
- H. ASTM C91/C91M - Standard Specification for Masonry Cement; 2018.
- I. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2017.
- J. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- K. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- L. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2022.
- M. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
- N. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.
- O. ASTM C476 - Standard Specification for Grout for Masonry; 2020.
- P. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2019a.
- Q. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.
- R. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.
- S. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.
- T. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.
- U. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.05 SUBMITTALS

- A. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- B. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Fire Rated Assemblies: Comply with applicable code for fire resistive requirements for fire rated masonry construction.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.

1.07 MOCK-UPS

- A. See Section 01 43 39.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Fire Rated Assemblies: As indicated on the drawings.
 - 2. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
 - 3. Special Shapes: Provide non-standard blocks configured for corners, lintels, headers, bonding, and other detailed conditions.
 - 4. Nonloadbearing Units: ASTM C129.
 - a. Hollow block, as indicated.
 - b. Normal weight.

2.02 BRICK UNITS

- A. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
 - 1. Nominal size: Match existing.

2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M, Type N or O as indicated.
- B. Portland Cement: ASTM C150/C150M, Type I.

- C. Mortar Aggregate: ASTM C144.
- D. Grout Aggregate: ASTM C404.
- E. Water: Clean and potable.
- F. Packaged Dry Material for Mortar for Unit Masonry: Premixed masonry cement and mason's sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Types as scheduled in this section.
 - 2. Color: Standard gray.
 - 3. Water-repellent mortar for use with water-repellent masonry units.
- G. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
 - 1. Type: Fine.
- H. Mortar for Repointing: As specified in Section 04 01 00 - Maintenance of Masonry.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized. Size as indicated on Structural drawings.
- B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- C. Single Wythe Joint Reinforcement: ASTM A951/A951M.
 - 1. Type: Truss or ladder.
 - 2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
 - 3. Refer to Structural drawings.
- D. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch of mortar coverage from masonry face.
 - 1. Concrete frame: Dovetail anchors of bent steel strap, nominal 1 inch width x 0.024 in thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
 - 2. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.

2.05 FLASHINGS

- A. Metal Flashing Materials:
- B. Stainless Steel/Polymer Fabric Flashing: ASTM A240/A240M; 2 mil type 304 stainless steel sheet bonded on one side to one sheet of polymer fabric.
- C. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.
- D. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

2.06 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
 - 1. Manufacturers:
 - a. Blok-Lok Limited; _____: www.blok-lok.com/#sle.
 - b. Hohmann & Barnard, Inc; _____: www.h-b.com/#sle.
 - c. WIRE-BOND; _____: www.wirebond.com/#sle.
- B. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 LINTELS

- A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
- B. Refer to Structural drawings.

2.08 MORTAR AND GROUT MIXING

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 - 1. Exterior, non-loadbearing masonry: Type N.
 - 2. Interior, non-loadbearing masonry: Type O.
- B. New Mortar for Old Brick: As specified in Section 04 01 00 - Maintenance of Masonry.
- C. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

- D. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- E. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.04 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Flush unless indicated otherwise.
- D. Brick Units for Repair and Infill:
 - 1. Bond: Match existing.
 - 2. Coursing: Match existing.
 - 3. Mortar Joints: Flush at flat plaster parge coat applications.
 - a. Match existing at exposed locations.

3.05 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Cut mortar joints flush where fluid-applied or adhered weather barrier is applied and where cement parging is required.
- I. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.
 - 1. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 07 84 00 - Firestopping.

3.06 REINFORCEMENT AND ANCHORAGE - GENERAL AND SINGLE WYTHE MASONRY

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.
- E. Lap joint reinforcement ends minimum 6 inches.
- F. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

- G. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

3.07 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up flashing ends at least 1 inch, minimum, to form watertight pan at nonmasonry construction.
 - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
 - 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Terminate flashing up 8 inches minimum on vertical surface of backing:
 - 1. Install vertical leg of flashing over fluid-applied or self-adhered air/vapor barriers over backing or per manufacturer's directions.
 - 2. Anchor vertical leg of flashing into backing with a termination bar and sealant.
- C. Extend laminated flashings to within 1/2 inch of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.
- D. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.08 LINTELS

- A. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
 - 1. Refer to Structural drawings for reinforcing.
 - 2. Do not splice reinforcing bars.
 - 3. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
 - 4. Place and consolidate grout fill without displacing reinforcing.
 - 5. Allow masonry lintels to attain specified strength before removing temporary supports.

3.09 GROUTED COMPONENTS

- A. Refer to Structural drawings.

- B. Lap splices minimum 24 bar diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.
- E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.10 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Form control joint with a sheet of building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.
- E. Form expansion joint as detailed on drawings.

3.11 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.12 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

- F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.13 CUTTING AND FITTING

- A. Cut and fit for chases, pipes, conduit, and sleeves. Coordinate with other sections of work to provide correct size, shape, and location.

3.14 PARGING

- A. Refer to Section 09 03 00 - Conservation Treatment of Period Finishes and Section 09 24 00 - Cement Plastering.
- B. Dampen masonry walls prior to parging.
- C. Strike top edge of parging at 45 degrees.

3.15 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

3.16 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.17 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 20 00

SECTION 04 20 01
MASONRY VENEER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mortar and grout.
- B. Reinforcement and anchorage.
- C. Installation of lintels.

1.02 RELATED REQUIREMENTS

- A. Section 04 01 00 - Maintenance of Masonry.
- B. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.
- C. Section 09 24 00 - Cement Plastering: Parge coat materials.
- D. Section 09 91 13 - Exterior Painting

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2022.
- C. ASTM C91/C91M - Standard Specification for Masonry Cement; 2018.
- D. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- E. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- F. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2022.
- G. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
- H. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.
- I. ASTM C476 - Standard Specification for Grout for Masonry; 2020.

1.04 SUBMITTALS

- A. Product Data: Provide data for masonry units, anchors, mortar, and anchors.

- B. Mix Designs: Include description of type and proportions of ingredients.
- C. Certification: Submit manufacturer's affidavit that materials used in Project contain no asbestos.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.
- C. Single Source Responsibility:
 - 1. For Masonry Units: Obtain masonry units of uniform texture and color, or a uniform blend within the accepted ranges for those characteristics, from one (1) manufacturer for each different product required for each continuous surface or visually related surfaces.
 - 2. For Mortar and Grout Materials: Brands of cementitious materials and admixtures, and the source of supply of sand and aggregates shall remain the same throughout the Work where exposed to view and where not scheduled to receive a subsequently applied finish, i.e. parging, painting, etc., unless directed otherwise in writing by the Owner.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.07 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

1.08 WARRANTY

- A. Warrant the Work specified herein for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship. Defects shall include, but not be limited to, the following:
 - 1. Noticeable deterioration of unit or mortar finish.
 - 2. Chalking or dusting excessively.
 - 3. Changing color in irregular fashion.
 - 4. Cracking or spalling.
 - 5. Releasing from substrate.

6. Staining or discoloring, including efflorescence.

PART 2 PRODUCTS

2.01 BRICK UNITS

- A. Facing Brick: ASTM C216, Type FBS Smooth, Grade SW.
 1. Color and Texture: As selected by Architect from manufacturer's full range.
 2. Nominal Size: Estate Brick: 2-3/4 by 4 by 10 inches (nominal).

2.02 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M Type N.
- B. Portland Cement: ASTM C150/C150M, Type I.
- C. Hydrated Lime for Grout: ASTM C207, Type S.
- D. Hydrated Lime for Mortar: ASTM C207, Type N.
- E. Grout Aggregate: ASTM C404.
- F. Water: Clean and potable.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A153/A153M, Class B.
 1. Stud wall anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
 2. Structural steel anchor plates: Crimped 0.025 inch- diameter wire designed for welding to steel.
 3. Concrete anchors: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section fabricated from 12 ga. sheet.
 4. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
 5. Vertical adjustment: Not less than 3-1/2 inches.

2.04 FLASHINGS

- A. Copper/Polymer Film or Fabric Flashing: 3 oz/sq ft copper sheet laminated between two sheets of polymer or fiberglass fiber-reinforced film.

- B. Stainless Steel/Polymer Fabric Flashing: ASTM A240/A240M; 2 mil type 304 stainless steel sheet bonded on one side to one sheet of polymer fabric.
- C. Drip Edge: Stainless steel; compatible with membrane and adhesives.
- D. Lap Sealant: Butyl type as specified in Section 07 92 00 - Joint Sealants.

2.05 ACCESSORIES

- A. Preformed Control Joints: Neoprene material. Provide with corner and tee accessories, fused joints.
- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.
- C. Weeps/Cavity Vents: UV-resistant polypropylene copolymer, full height and width of head joint in color selected from manufacturer's standard range.
 - 1. Type: Extruded propylene with honeycomb design.
 - 2. Color(s): As selected by Architect from manufacturer's full range.
- D. Cavity Vents:
 - 1. Type: Polyester mesh.
 - 2. Color(s): As indicated on drawings.
- E. Drainage Fabric: Polyester mesh bonded to a water and vapor-permeable fabric.
- F. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
 - 1. Mortar Diverter: Panels installed at flashing locations.
 - a. Manufacturers:
 - 1) Advanced Building Products Inc; Product Mortar Break-DT: www.advancedbuildingproducts.com
 - 2) Mortar Net USA, Ltd; Product Wall Defender: www.mortarnet.com.
 - 3) Hohmann & Barnard Inc; Product Mortar Trap: www.h-b.com.
- G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.06 MORTAR AND GROUT MIXING

- A. Mortar for Unit Masonry: ASTM C270, Proportion Specification.

- B. Grout: ASTM C476; consistency as required to fill volumes completely for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
- C. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Three units and three mortar joints to equal 10 inches.
 - 3. Mortar Joints: Concave.

3.03 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar as work progresses.
- D. Interlock intersections and external corners.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.04 WEEPS/CAVITY VENTS

- A. Install weeps in veneer walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.
- B. Install cavity vents in veneer walls at 24 inches on center, minimum, horizontally at top of walls.

3.05 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.06 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Masonry Back-Up: Embed anchors in masonry back-up to bond veneer at maximum 1.77 sq ft of wall surface per anchor. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

3.07 LINTELS

- A. Install loose steel lintels over openings.

3.08 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Locate expansion and control joints as shown on Drawings and as follows:
 - 1. On straight walls without openings, maximum 25 feet apart.
 - 2. Along the edge or jamb of openings.
 - a. Openings under 6 feet wide require joint on one side of the opening.
 - b. Openings over 6 feet wide require joints on both sides of opening.
- C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- D. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.
- E. Form expansion joint as detailed on drawings.

3.09 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

- B. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- C. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- D. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

3.10 CUTTING AND FITTING

- A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.11 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.

3.12 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 20 01

SECTION 051200 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Structural steel framing members.
- B. Structural steel support members, suspension cables, sag rods, and struts.
- C. Base plates, shear stud connectors and expansion joint plates.
- D. Grouting under base plates.

1.2 RELATED REQUIREMENTS

- A. Section 051213 - Architecturally-Exposed Structural Steel Framing: Additional requirements for structural steel members designated as architecturally-exposed structural steel (AESS).
- B. Section 052100 - Steel Joist Framing.
- C. Section 053100 - Steel Decking: Support framing for small openings in deck.
- D. Section 055000 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.3 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; 2023.
- B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2022.
- C. AISC 325 - Steel Construction Manual; 2017.
- D. ASTM A1 - Standard Specification for Carbon Steel Tee Rails; 2000 (Reapproved 2018).
- E. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- G. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2018.
- H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- I. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

- J. ASTM A242/A242M - Standard Specification for High-Strength Low-Alloy Structural Steel; 2013 (Reapproved 2018).
- K. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- L. ASTM A449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use; 2014 (Reapproved 2020).
- M. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.
- N. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- O. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2019.
- P. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.
- Q. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2021, with Editorial Revision.
- R. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2022.
- S. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- T. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures; 2023.
- U. ASTM E94/E94M - Standard Guide for Radiographic Examination Using Industrial Radiographic Film; 2017.
- V. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2019.
- W. ASTM E165/E165M - Standard Practice for Liquid Penetrant Testing for General Industry; 2023.
- X. ASTM E709 - Standard Guide for Magnetic Particle Testing; 2021.
- Y. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2019.
- Z. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.
- AA. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi

Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

- BB. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- CC. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- DD. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).
- EE. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.
- FF. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2020.
- GG. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- HH. SSPC-SP 3 - Power Tool Cleaning; 2018.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - 2. Connections not detailed.
 - 3. Indicate cambers and loads.
 - 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.
- E. Fabricator Test Reports: Comply with ASTM A1011/A1011M.
- F. Materials Test Reports: Submit independent test results or engineered performance analysis of structural thermal-break pad performance in bearing or slip-critical connections where shear and moment loads are applied.
- G. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- H. Designer's Qualification Statement.
- I. Fabricator's Qualification Statement.
- J. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.5 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."
- B. Structural steel members designated as architecturally-exposed structural steel (AESS) to also comply with Section 051213.
- C. Maintain one copy of each document on site.
- D. Fabricator: Company specializing in performing the work of this section with minimum 5 years of documented experience.
- E. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.
- F. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
- G. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience.
- H. Design connections not detailed on drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Steel W Shapes and Tees: ASTM A992/A992M.
- C. Rolled Steel Structural Shapes: ASTM A992/A992M.
- D. Steel Shapes, Plates, and Bars: ASTM A242/A242M high-strength, corrosion-resistant structural steel.
- E. Steel Shapes, Plates, and Bars: ASTM A529/A529M high-strength, carbon-manganese structural steel, Grade 50.
- F. Steel Plates and Bars: ASTM A572/A572M, Grade 50 (345) high-strength, columbium-vanadium steel.
- G. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.
- H. Hot-Formed Structural Tubing: ASTM A501/A501M, seamless or welded.

- I. Pipe: ASTM A53/A53M, Grade B, Finish black.
- J. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M Class C.
- K. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563/A563M nuts and ASTM F436/F436M washers.
- L. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563/A563M nuts and ASTM F436/F436M Type 1 washers.
- M. Headed Anchor Rods: ASTM F1554 Grade 36, plain.
- N. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- O. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch (13.7 MPa).
 - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch (48 MPa).
 - 3. Height Change, Plastic State; when tested according to ASTM C827/C827M:
 - a. Maximum: Plus 4 percent.
 - b. Minimum: Plus 1 percent.
- P. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- Q. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.2 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- C. Fabricate connections for bolt, nut, and washer connectors.

2.3 FINISH

- D. Prepare structural component surfaces in accordance with SSPC-SP 3.
- E. Galvanize structural steel members to comply with ASTM A123/A123M. Provide minimum 1.7 oz/sq ft galvanized coating. (Provide minimum 530 g/sq m galvanized coating.)

2.4 SOURCE QUALITY CONTROL

- F. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts," testing at least 5 percent of bolts at each connection.

- G. Welded Connections: Visually inspect all shop-welded connections and test at least 50 percent of welds using one of the following:
 - 1. Radiographic testing performed in accordance with ASTM E94/E94M.
 - 2. Ultrasonic testing performed in accordance with ASTM E164.
 - 3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
 - 4. Magnetic particle inspection performed in accordance with ASTM E709.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.2 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Field weld components and shear studs indicated on shop drawings.
- D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
- E. Do not field cut or alter structural members without approval of Architect.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.3 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

3.4 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.

- B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts," testing at least 10 percent of bolts at each connection.
- C. Welded Connections: Visually inspect all field-welded connections and test at least 50 percent of welds using one of the following:
 - 1. Radiographic testing performed in accordance with ASTM E94/E94M.
 - 2. Ultrasonic testing performed in accordance with ASTM E164.
 - 3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
 - 4. Magnetic particle inspection performed in accordance with ASTM E709.

3.5 END OF SECTION 05120

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10 44 00	FIRE PROTECTION SPECIALTIES
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SECTION 05 50 01

METAL FABRICATIONS FOR LANDSCAPING

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. Pool fence and gates
 - 2. Custom Pergola
- B. Related Sections:
 - 1. Section 055800 "Formed Metal Fabrications" for steel framing

1.3 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures.
- B. Product Data: Submit manufacturer's product data and installation instructions for custom perforated metal architectural designs, including manufacturer's SPEC-DATA® product sheet. Include material, finish, available thicknesses and opening sizes.
- C. Drawings: Submit shop drawings detailing installation procedures, including layout, dimensions, anchorage, reinforcement, connections, supports and support placement.
- D. Samples: Submit selection and verification samples for finishes, colors and textures in accordance with Division 1 Submittal Procedures.
- E. Shop Drawings: Show fabrication and installation details for all metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified professional engineer.
- B. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.

- C. Welding certificates.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Fabrication performed in quality controlled manufacturing environment by experienced fabricators with references indicating multiple satisfactory experiences fabricating perforated metals as required for this project.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated.
- C. Do not modify intended aesthetic effects, as judged solely by Landscape Architect, except with Landscape Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Landscape Architect for review.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6, "Structural Welding Code - Stainless Steel."
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
- F. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

1.8 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

- B. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
- B. Extruded Bars and Shapes: ASTM B 221, Alloy 6063-T5/T52.
- C. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.

2.3 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500, cold-formed steel tubing.

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide galvanized or zinc-coated fasteners for fastening galvanized steel.
 - 2. Provide stainless-steel fasteners for fastening stainless steel or aluminum
 - 3. Provide stainless-steel fasteners for fastening nickel silver.
 - 4. Provide bronze fasteners for fastening bronze.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 with hex nuts, and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594 and, where indicated, flat washers.
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3
- G. Lag Screws: ASME B18.2.1
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1
- J. Lock Washers: Helical, spring type, ASME B18.21.1
- K. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- L. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, size as indicated on plans by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.5 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.
- F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- G. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
1. Fabricate units from slotted channel framing where indicated.
 2. Furnish inserts for units installed after concrete is placed.
- C. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch pipes for anchor and connection bolts.
1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
- D. Galvanize miscellaneous framing and supports where indicated.

2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly and any necessary field welding
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.9 ALUMINUM FINISHES

- A. Primer Application: Apply shop primer to prepared surfaces of items unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
1. Shop prime uncoated ferrous-metal surfaces with universal shop primer unless zinc-rich primer is indicated.
 2. Do not apply primer to galvanized surfaces.

- B. Powder-Coat Finish: Prepare, treat, and coat nongalvanized ferrous metal to comply with resin manufacturer's written instructions and as follows:
 - 1. Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Treat prepared metal with iron-phosphate pretreatment, rinse, and seal surfaces.
 - 3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm).
 - 4. Color: TBD by Landscape Architect.

2.10 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Embed pipe columns in concrete footings as shown on the drawings.
 - 1. Utilize temporary bracing as necessary to ensure columns remain plumb while concrete cures.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 05 52 13
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Free-standing pip railings at storage room.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of anchors and sleeves in concrete.
- B. Section 04 20 00 - Unit Masonry: Placement of anchors in masonry.
- C. Section 05 51 00 - Metal Stairs: Handrails other than those specified in this section.
- D. Section 09 91 13 - Exterior Painting: Paint finish.
- E. Section 09 91 23 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2020.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021a.
- E. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.
- F. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2021.
- G. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).
- I. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- J. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's seal and signature on each sheet of shop drawings.
- B. Samples: Submit manufacturer's standard samples of handrail. Submit two samples of elbow, wall bracket, and end stop.

1.05 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
- B. Fabricator Qualifications:
 - 1. A company specializing in manufacturing products specified in this section, with not less than ten years of experience.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.
- B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 50 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set.
- C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set.
- D. Allow for expansion and contraction of members and building movement without damage to connections or members.
- E. Dimensions: See drawings for configurations and heights.
 - 1. Freestanding Rails: 1-1/2 inches diameter, round.
 - 2. Intermediate Rails: 1-1/2 inches diameter, round.
 - 3. Posts: 1-1/2 inches diameter, round.

4. Balusters: 1/2 inch square solid bar.
- F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 1. For post anchorage to concrete, provide sleeves not less than 6 inches long with inside dimension not less than 1/2 inch greater than outside dimension of post.
 2. For anchorage to masonry, provide brackets to be embedded in masonry, for bolting anchors.
 3. For anchorage to stud walls, provide backing plates, for bolting anchors.
 4. Posts: Provide adjustable flanged brackets.
- G. Provide mechanical and welding fittings where indicated to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.
- H. Welded and Brazed Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
 1. Ease exposed edges to a small uniform radius.
 2. Welded Joints:
 - a. Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.

2.02 STEEL RAILING SYSTEM

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Steel Tube: ASTM A500/A500M Grade B cold-formed structural tubing.
- C. Steel Pipe: ASTM A53/A53M Grade B Schedule 80, black finish.
- D. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.
- E. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- F. Exposed Fasteners: No exposed bolts or screws.
- G. Provide handrail bracket with 2-1/2 inch clearance from inside face of handrail to adjacent surface.
- H. Galvanizing: In accordance with requirements of ASTM A123/A123M.

1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic.
- I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.03 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured.
- D. Welded Joints:
 1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 2. Interior Components: Continuously seal joined pieces by continuous welds.
 3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Weld connections that cannot be shop welded due to size limitations.
 1. Weld in accordance with AWS D1.1/D1.1M.
 2. Match shop welding and bolting.
 3. Clean welds, bolted connections, and abraded areas.
 4. Touch up shop primer and factory-applied finishes.
 5. Repair galvanizing with galvanizing repair paint per ASTM A780/A780M.

2.04 STEEL FINISHES

- A. Interior Railings: Shop-primed and field-painted.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.

- B. Supply items required to be cast into concrete with setting templates, for installation as work of other sections.

3.03 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- B. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- C. Anchor railings securely to structure.
- D. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.
- E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- F. Anchor posts into preset concrete sleeves; fill annular space with nonshrink, nonmetallic grout or anchoring cement.
 - 1. Contractor Option: Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than outside dimension of post. Set post and fill annular space with nonshrink, nonmetallic grout or anchoring cement.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 05 52 13

SECTION 05 70 00
DECORATIVE METAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Railing and guardrail assemblies.

1.02 RELATED REQUIREMENTS

- A. Section 01 74 19 - Construction Waste Management and Disposal: Additional requirements for cleaning.
- B. Section 05 50 00 - Metal Fabrications: Supports.
- C. Section 07 42 13 - Metal Wall Panels.
- D. Section 07 92 00 - Joint Sealants.
- E. Section 08 80 00 - Glazing: Polycarbonate light diffusers.
- F. Section 09 21 16 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.
- G. Section 09 91 13 - Exterior Painting - Field Finishing of steel elements
- H. Section 09 91 23 - Interior Painting: Field-finishing of steel elements.
- I. Division 26: Lighting fixtures.

1.03 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- E. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.
- F. ASTM B135/B135M - Standard Specification for Seamless Brass Tube; 2017.
- G. ASTM B248 - Standard Specification for General Requirements for Wrought Copper and Copper Alloy Plate, Sheet, Strip, and Rolled Bar; 2022.

- H. ASTM B248M - Standard Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar (Metric); 2022.
- I. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements; 2022.
- J. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2021.
- K. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.
- L. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).
- M. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel; 2017, with Amendment (2021).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Schedule and conduct a preinstallation meeting one week before starting work of this section. Attendees shall include, but not be limited to:
 - 1. Contractor.
 - 2. Installer/fabricator's representative.
 - 3. Architect.
 - 4. Owner's representative.
 - 5. Other subcontractors of adjacent work.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, anchors, and accessories.
- B. Shop Drawings: Indicate elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, connections, transitions, and terminations.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Samples: Submit one (1) of each item below for each type and condition shown.
 - 1. Railing: 12 inch long section of handrail illustrating color, finish and connection detail.

2. Metal Trim with Shop Finish: 12 inch by 12 inch, illustrating surface preparation and finish. Include sample seam.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Installer/Fabricator Qualifications: Company specializing in performing work of type specified and with at least three years of experience.
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.6/D1.6M no more than 12 months before start of scheduled welding work.

1.07 MOCK-UPS

- A. Provide manufacturer's standard mock-up of railing system and guardrail, illustrating each type of material, cladding, and finish.
- B. Locate where directed.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect materials against damage during transit, delivery, storage, and installation at site.
- B. Inspect materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.
- C. Prior to installation, store materials and components under cover in a dry location.

1.09 WARRANTY

- A. Warranty: Manufacturer's standard one year warranty against defects in materials, fabrication, finishes, and installation commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Decorative Metal Railings:
 1. Greco Aluminum Railings: www.grecorailings.com/#sle.
 2. Trex Commercial Products, Inc: www.trexcommercial.com/#sle.
 3. Stainless Fabricators, Inc: www.stainlessfabinc.com/#sle.
 4. Superior Aluminum Products, Inc: www.superioraluminum.com/#sle.

5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 RAILING SYSTEMS

- A. Railing Systems - General: Factory- or shop-fabricated in design indicated, to suit specific project conditions, and for proper connection to building structure, and in largest practical sizes for delivery to site.
1. Performance Requirements: Design and fabricate railings and anchorages to resist the following loads without failure, damage, or permanent set; loads do not need to be applied simultaneously.
 - a. Lateral Force: 75 lb minimum, at any point, when tested in accordance with ASTM E935.
 - b. Distributed Load: 50 lb/ft minimum, applied in any direction at the top of the handrail, when tested in accordance with ASTM E935.
 - c. Concentrated Loads on Intermediate Rails: 50 psf, minimum.
 - d. Concentrated Load: 200 lbs minimum, applied in any direction at any point along the handrail system, when tested in accordance with ASTM E935.
 - e. Handrails: Comply with applicable accessibility requirements of ADA Standards.
 2. Assembly: Join lengths, seal open ends, and conceal exposed mounting bolts and nuts using slip-on non-weld mechanical fittings, flanges, escutcheons, and wall brackets.
 3. Joints: Tightly fitted and secured, machined smooth with hairline seams.
 4. Field Connections: Provide sleeves to accommodate site assembly and installation.
 5. Welded and Brazed Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
 - a. Ease exposed edges to a small uniform radius.
 - b. Welded Joints:
 - 1) Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.
- B. Metal Plate Guardrail System, Base-Mounted: Engineered, base supported system with metal plates.
1. Configuration: Guardrail only.
 2. Top Rail: None.
 3. Metal Plate: As specified in this section.

4. Fasteners:

a. Attachment to Concrete:

- 1) Provide anchors capable of sustaining, without failure, a load equal to four times the load imposed when installed in concrete, tested in accordance with ASTM E488/E448M.

2.03 MATERIALS

A. Steel Trim Components:

1. Sections, Shapes, Plate and Bar: ASTM A36/A36M.
2. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230 with G40/Z120 coating.
3. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

B. Shop Finishes: Powder coat after fabrication.

1. Color: As selected by Architect.

C. Brass Components:

1. Tubing: ASTM B135/B135M, CDA 260.
2. Sheet: ASTM B248 or ASTM B248M, No. 26 Yellow Brass.
3. Brass Finish: Satin Brushed.
4. Protective Coating: Lemon oil seal.

2.04 ACCESSORIES

A. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground smooth.

B. Welding Materials: AWS D1.2; type required for materials being welded.

C. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

1. For anchorage to masonry, provide brackets to be embedded in masonry for bolt anchors.
2. For anchorage to stud walls, provide backing plates for bolt anchors.
3. Exposed Fasteners: Countersink.

D. Carbon Steel Bolts and Nuts: ASTM A307.

- E. Rubber spacer: As recommended by manufacturer.
- F. Sealant: Silicone; black.
- G. Finish Touch-Up Materials: As recommended by manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field dimensions of locations and areas to receive work.
- B. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates, and supports for attachment of anchors.

3.02 PREPARATION

- A. Protect existing work.
- B. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions, and directions for installation of anchorages and fasteners.
- C. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

3.03 INSTALLATION

- A. Comply with approved shop drawings and written instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, and with tight joints, except where necessary for expansion.
- C. Anchor securely to structure.
- D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- E. Weld connections that cannot be shop welded due to size limitations.
 - 1. Weld in accordance with AWS D1.1/D1.1M.
 - 2. Match shop welding and bolting.
 - 3. Clean welds, bolted connections, and abraded areas.
 - 4. Touch up shop primer and factory-applied finishes.
 - 5. Repair galvanizing with galvanizing repair paint per ASTM A780/A780M.

- F. Isolate dissimilar materials with bituminous coating, bushings, grommets, or washers to prevent electrolytic corrosion.
- G. Install lighting fixtures and circuiting as specified in Division 26.
- H. Install glazing using silicone sealant or gaskets and exposed fasteners at face.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

3.05 CLEANING

- A. Remove protective film from exposed metal surfaces.
- B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents, or other substances that may damage the material or finish.
- C. Glass and Glazing: Clean glazing surfaces; remove excess glazing sealant compounds, dirt, and other substances.
- D. See Section 01 74 19 - Construction Waste Management and Disposal for additional requirements.

3.06 PROTECTION

- A. Protect installed components and finishes from damage after installation.

END OF SECTION 05 70 00

SECTION 05 75 00
DECORATIVE FORMED METAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabrications made of formed metal sheet, secondary supports, and anchors to structure, including:
 - 1. Interior handrail.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Non-decorative metal fabrications.
- B. Section 07 42 13 - Metal Wall Panels.
- C. Section 07 62 00 - Sheet Metal Flashing and Trim: Formed metal flashings and trim.
- D. Section 07 90 05 - Joint Sealers.
- E. Section 08 80 00 - Glazing: Polycarbonate light diffusers.
- F. Section 09 91 23 - Interior Painting.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2017.
- D. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2022.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- G. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.
- H. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2021a.
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).

- J. NAAMM AMP 500-06 - Metal Finishes Manual; 2006.
- K. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- L. SSPC-SP 5 - White Metal Blast Cleaning; 2007.

1.04 SUBMITTALS

- A. Product Data - Sheet Metal Material: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, number of anchors, supports, reinforcement, trim, flashings, glazing, and accessories.
 - 1. Differentiate between shop and field fabrication.
 - 2. Indicate substrates and adjacent work with which the fabrications must be coordinated.
 - 3. Include large-scale details of anchorages and connecting elements.
 - 4. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
- C. Verification Samples: For each finish product specified, minimum size 12 inches square, representing actual product in color and texture.
- D. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating products specified in this section.
 - 1. With not less than three years of experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section.
 - 1. With minimum 3 years of experience.
 - 2. Approved by fabricator.
- C. Mock-Up: Provide a full-sized mock-up of one entire light box unit for evaluation of fabrication workmanship.

1. Locate where directed.
2. Provide products finished as specified.
3. Mock-up may remain as part of the Work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 1. Store in well-ventilated space out of direct sunlight.
 2. Protect from moisture and condensation with tarpaulins or other suitable weathertight covering installed to provide ventilation.
 3. Store at a slope to ensure positive drainage of accumulated water.
 4. Do not store in enclosed space where ambient temperature can exceed 120 degrees F.
 5. Avoid contact with other materials that might cause staining, denting, or other surface damage.

1.07 WARRANTY

- A. Warranty: Provide one year warranty against defects in materials, fabrication, finishes, and installation commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 FORMED METAL FABRICATIONS - GENERAL

- A. Shop Assembly: Preassemble items to greatest extent possible. Minimize field splices and field assembly. Disassemble only as necessary for transportation and handling. Mark items clearly for assembly and installation.
- B. Coordination: Match dimensions and attachment of formed metal items to adjacent construction. Produce integrated assemblies. Closely fit joints; align edges and flat surfaces unless indicated otherwise.
- C. Forming: Profiles indicated. Maximize lengths. Fold exposed edges to form hem indicated or ease edges to radius indicated with concealed stiffener. Provide flat, flush surfaces without cracking or grain separation at bends.
- D. Reinforcement: Increase metal thickness; use concealed stiffeners, backing materials or both. Provide stretcher leveled standard of flatness and stiffness required to maintain flatness and hold adjacent items in flush alignment.
- E. Anchors: Straps, plates and anchors as required to support and anchor items to adjacent construction.

- F. Supports: Miscellaneous framing, mounting, clips, sleeves, fasteners and accessories required for installation.
- G. Welding and Brazing: Weld or braze joints continuously. Grind, fill or dress to produce smooth, flush, exposed surfaces. Do not discolor metal. Grind smooth, polish, and restore damaged finishes to required condition.
 - 1. Welded Joints:
 - a. Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.
- H. Performance Requirements:
 - 1. Thermal Movements:
 - a. Allow for thermal movements in exterior metal fabrications due to temperature changes. Prevent buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - b. Temperature Change Range: 120 degrees F, ambient; 180 degrees F, on material surfaces.
 - 2. Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

2.02 FORMED METAL FABRICATIONS - SHEET METAL

- A. Closures, Trim and Fill Panels:
 - 1. Form closures from type and thickness of metal indicated.
 - 2. Conceal fasteners when possible.
 - 3. Drill and tap holes for securing to other surfaces.
 - 4. Provide gaskets where indicated or needed for continuous seal at adjacent surfaces.
 - 5. Miter or cope at corners and reinforce with bent metal plate. Form tight joints.

2.03 MATERIALS

- A. General: Provide sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections exposed to view on finished units.
- B. Galvanized Steel Sheet: ASTM A653/A653M, G90 (Z275) coating.
- C. Steel Sheet: ASTM A1008/A1008M; uncoated cold rolled Type CS (commercial steel) exposed or ASTM A879/A879M electrolytic zinc coating over ASTM A1008/A1008M steel sheet substrate.

- D. Metal Framing Members: Include all framing profiles and furring channels required for complete installation.
 - 1. Provide material strength, dimensions, configuration as required to meet the applied loads applied and in compliance with applicable building code.
 - 2. Sheet Steel Components: ASTM A653/A653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60; or ASTM A792/A792M aluminum-zinc coated to AZ60.
- E. Anchors, Clips and Accessories:
 - 1. Use one of the following:
 - a. Stainless steel complying with ASTM A276/A276M, ASTM A480/A480M, ASTM A666, ASTM A276/A276M, ASTM A480/A480M, ASTM A666, ASTM A276/A276M, ASTM A480/A480M, or ASTM A666.
 - b. Steel complying with ASTM A36/A36M and hot-dipped galvanized to ASTM A153/A153M.
 - 2. Structural Anchors: Provide anchors where work is indicated to comply with design loads.
 - 3. Nonstructural Anchors: Provide metal expansion sleeve anchors where work is not indicated to comply with design loads. Provide size and number required for load, installation, and as recommended by manufacturer, unless indicated otherwise.
- F. Fasteners, General: Same basic metal and alloy as formed metal sheet unless indicated otherwise. Do not use metals incompatible with the materials joined.
- G. Gaskets: As required to seal joints in decorative formed metal and remain weathertight.
- H. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 15 mil dry film thickness per coat.
- I. Joint Sealer: As specified in Section 07 92 00 - Joint Sealants; compatible with adjacent materials.

2.04 PAINTS AND COATINGS

- A. As specified in Section 09 91 23.

2.05 FINISHES

- A. Finishes, General: Comply with NAAMM AMP 500-06.
 - 1. Complete mechanical finishes before fabrication. After fabrication, finish joints, bends, abrasions and surface blemishes to match sheet.
 - 2. Protect mechanical finishes on exposed surfaces from damage.

3. Appearance: Limit variations in appearance of adjacent pieces to one-half of range represented in approved samples. Noticeable variations in same piece are not acceptable. Install components within range of approved samples to minimize contrast.

B. Galvanized Steel Finishes:

1. Repair Galvanized Surfaces: Clean welds and abraded areas and repair galvanizing to comply with ASTM A780/A780M.
2. Powder-Coat Finish: Manufacturer's standard thermosetting polyester or acrylic urethane powder coating; minimum cured-film thickness of 1.5 mils.

C. Steel Finishes:

1. Surface Preparation: Comply with SSPC-SP 1; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust from uncoated steel; comply with SSPC-SP 5.
2. Pretreatment: Immediately after cleaning, apply a conversion coating of type suited to organic coating applied over it.
3. Powder-Coat Finish: Manufacturer's standard thermosetting polyester or acrylic urethane powder coating; minimum cured-film thickness of 1.5 mils.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and interfaces with other work.

3.02 PREPARATION

- A. Protect adjacent work areas and finish surfaces from damage during installation.
- B. Coat concrete and masonry surfaces that will be in contact with metal surfaces with bituminous coating.

3.03 INSTALLATION - SHEET METAL AND PLATE FABRICATIONS

- A. Locate and place decorative formed sheet metal items level and plumb; align with adjacent construction. Cut, drill and fit as required to install.
- B. Do not cut or abrade sheet metal finishes that cannot be completely restored in the field. Return such items to manufacturer or fabricator for required alterations and refinishing or provide new items.
- C. Use concealed anchorages where possible. Provide washers where needed on bolts or screws to protect metal surfaces and make weathertight connection.

- D. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers indicated.
- E. Install gaskets, joint fillers, insulation, sealants, and flashings as work progresses.
 - 1. Make exterior decorative formed sheet metal items weatherproof.
- F. Corrosion Protection: Apply permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with incompatible substrate materials. Prevent corrosion damage to material and finish.
- G. Install lighting fixtures and circuiting as specified in Division 26.
- H. Install glazing using silicone sealant or gaskets and exposed fasteners at face.

3.04 CLEANING

- A. Restore finishes damaged during installation and construction period. Return items that cannot be refinished in the field to manufacturer or fabricator. Refinish entire unit or provide new units.
- B. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.
- C. Remove temporary coverings and protection of adjacent work areas.
- D. Clean installed products in accordance with manufacturer's instructions.

3.05 PROTECTION

- A. Protect installed products from damage during construction.

END OF SECTION 05 75 00

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural dimension lumber framing.
- B. Exposed timber structural framing.
- C. Nonstructural dimension lumber framing.
- D. Rough opening framing for doors, windows, and roof openings.
- E. Sheathing where indicated for interior partitions.
- F. Preservative treated wood materials.
- G. Fire retardant treated wood materials.
- H. Miscellaneous framing and sheathing.
- I. Communications and electrical room mounting boards.
- J. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

- A. Section 06 17 53 - Shop-Fabricated Wood Trusses.
- B. Section 06 16 43 - GYPSUM SHEATHING.
- C. Section 07 25 00 - Weather Barriers: Water-resistive barrier over sheathing.
- D. Section 07 54 23 - Thermoplastic Polyolefin (TPO) Membrane Roofing.
- E. Section 07 62 00 - Sheet Metal Flashing and Trim: Sill flashings.
- F. Section 07 72 00 - Roof Accessories: Prefabricated roof curbs.
- G. Section 09 21 16 - Gypsum Board Assemblies.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2022.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.

- D. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2018.
- E. AWPA U1 - Use Category System: User Specification for Treated Wood; 2022.
- F. PS 1 - Structural Plywood; 2009 (Revised 2019).
- G. PS 2 - Performance Standard for Wood Structural Panels; 2018.
- H. PS 20 - American Softwood Lumber Standard; 2021.
- I. SPIB (GR) - Grading Rules; 2014.

1.04 SUBMITTALS

- A. Product Data: Provide technical data on wood preservative materials and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

1.06 WARRANTY

- A. See Section 01 77 00 - Closeout Procedures for additional warranty requirements.
- B. Manufacturer Warranty: Provide two-year manufacturer warranty for Plywood Sheathing commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Spruce-Pine-Fir (South), unless otherwise indicated.
 - 2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
 - 3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
- B. Provide sustainably harvested wood; see Section 01 60 00 - Product Requirements for requirements.
- C. Lumber fabricated from recovered timber is permitted in lieu of sustainably harvested lumber, unless otherwise noted, provided it meets the specified requirements for new lumber and is free of contamination; identify source.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Stud Framing (2 by 2 through 2 by 6):
 1. Species: Allowed under referenced grading rules.
 2. Grade: No. 2.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 1. Lumber: S4S, No. 2 or Standard Grade.
 2. Boards: Standard or No. 3.

2.03 EXPOSED DIMENSION LUMBER

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- B. Sizes: Nominal sizes as indicated on drawings.
- C. Surfacing: S4S.
- D. Moisture Content: S-dry or MC19.
- E. Stud Framing (2 by 2 through 2 by 6):
 1. Species: Western Cedar.
 2. Grade: Clear.

2.04 TIMBERS FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry (23 percent maximum).

C. Beams and Posts 5 inches and over in thickness:

1. Grade: Select Structural.

2.05 EXPOSED TIMBERS

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Moisture Content: Kiln-dry (20 percent maximum).
- C. Surfacing: S4S.
- D. Species: Redwood.
- E. Grade: Clear Heart Structural.

2.06 STRUCTURAL COMPOSITE LUMBER

- A. At Contractor's option, structural composite lumber may be substituted for concealed dimension lumber and timbers.
- B. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.

2.07 CONSTRUCTION PANELS

- A. Roof Sheathing: Particleboard, ANSI A208.1, Grade M-3 EXTERIOR GLUE; square edges, with panel clips.
- B. Wall Sheathing, For Parapets: PS 2 type.
 1. Bond Classification: Exterior.
 2. Grade: Structural I Sheathing.
 3. Span Rating: 24.
 4. Performance Category: 5/16 PERF CAT.
 5. Edge Profile: Square edge.
- C. Wall Sheathing: See Section 06 16 43.
- D. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- E. Other Applications:

1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
3. Other Locations: PS 1, C-D Plugged or better.
4. All applications may not be used on the project.

2.08 ACCESSORIES

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
2. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.

2.09 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment:

1. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Interior rough carpentry items are to be fire retardant treated.
 - c. Treat rough carpentry items as indicated .
 - d. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:

1. Preservative Pressure Treatment of Lumber Above Grade: AWP A U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber exposed to weather.
 - c. Treat lumber in contact with roofing, flashing, or waterproofing.
 - d. Treat lumber in contact with masonry or concrete.
 - e. Treat lumber otherwise contained in building envelope.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, AWC (WFCM) Wood Frame Construction Manual, and _____.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- D. Provide the following specific nonstructural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Towel and bath accessories.
 - 6. Wall-mounted door stops.

3.05 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at each roof opening except where specifically indicated otherwise; form corners by alternating lapping side members.

3.06 INSTALLATION OF CONSTRUCTION PANELS

- A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
 - 1. At long edges provide solid edge blocking where joints occur between roof framing members.
 - 2. Nail panels to framing; staples are not permitted.
- B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.

1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
3. Install adjacent boards without gaps.

3.07 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

3.08 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.09 CLEANING

- A. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 06 10 00

SECTION 06 15 00
COMPOSITE DECKING AND PEDESTAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Composite Decking (Trex Select).

1.02 REFERENCE STANDARDS

- A. ASTM D143 - Standard Test Methods for Small Clear Specimens of Timber; 2014.
- B. ASTM D198 - Standard Test Methods of Static Tests of Lumber in Structural Sizes; 2015.
- C. ASTM D1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials; 2012.
- D. ASTM D1761 - Standard Test Methods for Mechanical Fasteners in Wood; 2012.
- E. ASTM D4761 - Standard Test Methods for Mechanical Properties of Lumber and Wood-Based Structural Materials; 2019.
- F. ASTM D7031 - Standard Guide for Evaluating Mechanical and Physical Properties of Wood-Plastic Composite Products; 2011 (Reapproved 2019).
- G. ASTM D7032 - Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards, and Handrails; 2017.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.

1.03 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry.

1.04 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM D1037: Water Absorption of Plastics.
 - 2. ASTM D1761: Mechanical Fasteners in Wood.
 - 3. ASTM D1413: Test method for Wood Preservatives by Laboratory Soil-block Cultures.
 - 4. ASTM D7031: Standard Guide for Evaluating Mechanical and Physical Properties of Wood-Plastic Composite Products, ASTM International.
 - 5. ASTM D7032: Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails).

6. ASTM E84: Test Method for Surface Burning Characteristics of Building Materials, ASTM International.

B. Code Reports:

1. Nationally Recognized Testing Facilities:

- a. ICC Evaluation Services:

- 1) ESR-3168 Trex Transcend and Select Decking.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

- B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

- C. Shop Drawings:

1. Provide plans and details which include layout, spacing, and sizes of decking and railings.

- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

- E. Verification Samples: For each finish product specified, two samples, representing actual product color, size, and finish.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5 year experience manufacturing similar products.

- B. Installer Qualifications: Minimum 2 year experience installing similar products.

- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.
2. Do not proceed with remaining work until workmanship is approved by Architect.
3. Refinish mock-up area as required to produce acceptable work.

1.07 PRE-INSTALLATION MEETINGS

- A. Convene minimum two weeks prior to starting work of this section.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Store products on a flat and level surface. Adjust support blocks accordingly.
- C. Support bundles on supplied dunnage.
- D. When stacking bundles, supports should start approximately 8 inches from each end and be spaced approximately 2 feet on center. Supports shall line up vertically/perpendicular to the decking product.
- E. Do not stack Transcend decking more than 14 bundles. Do not stack Select or Enhance decking more than 12 bundles.
- F. Keep material covered using the provided bundle cover until time of installation.
- G. Handle materials to avoid damage.

1.09 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.10 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.11 WARRANTY

- A. Provide manufacturer's warranty against rot, decay, splitting, checking, splintering, fungal damage, and termite damage for a period of 25 years for 10 years beginning on date of Substantial Completion. In addition provide the Trex Fade and Stain Warranty against food staining and fading beyond 5 Delta E (CIE units) for a period 10 years beginning on the date of substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer: Trex Railing and Decking; 160 Exeter Dr., Winchester, VA 22603-8605. Tel: (540) 542-6300. Fax: (540) 542-6890. Email: marketing@trex.com Web: <http://www.trex.com>.
 - 1. Product: Trex Transcend and Select Decking.
- B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DESIGN/PERFORMANCE REQUIREMENTS:

A. Structural Performance:

1. Deck: Uniform Load - 100lb/sq.ft.
2. Tread of Stairs: Concentrated Load: 750 lbf on area of 4 sq. in., and 1/8 inch maximum deflection at a concentrated load of 300 lbf.
3. Railing: Trex Railing Systems meet various IRC and IBC requirements. Consult the label and published code evaluation reports for the performance levels of each system.

B. Fire-Surface Burning Characteristics per ASTM E-84.

2.03 COMPOSITE DECKING

A. Wood-Plastic Composite Lumber:

1. Product: Trex Transcend Decking Boards as manufactured by Trex Railing and Decking.
2. Material Description: Composite Decking consisting of recycled Linear Low Density Polyethylene (LLDPE) and recycled wood. The product is extruded into shapes and sizes as follows:
 - a. Width: 1 inch x 5.5 inches (25 mm x 140 mm).
 - b. Lengths - 12 feet 16 feet, and 20 feet.
 - c. Color - To be specified by owner from Trex' standard list of colors.
3. Physical and Mechanical Properties as follows:
 - a. Flame Spread, ASTM E 84: 70.
 - b. Thermal Expansion, ASTM D 1037: 0.000019 inch/inch/degree F.
 - c. Moisture Absorption, ASTM D 1037: Less than 1percent.
 - d. Screw Withdrawal, ASTM D1761: 588 lbs/in.
 - e. Fungus Resistance, ASTM D1413: Rating - no decay.
 - f. Termite Resistance, AWPAE1-72: Rating: 9.6.
 - g. Compression Parallel, ASTM D198: 1588 psi ultimate, 540 psi design.
 - h. Compression Perpendicular, ASTM D143: 1437 psi ultimate, 540 psi design.
 - i. Bending Strength, ASTM D198: 3280 psi ultimate, 500 psi design.
 - j. Shear Strength, ASTM D143: 1761 psi ultimate, 360 psi design.

- k. Modulus of Elasticity, ASTM D4761: 412,000 psi ultimate, 200,000 psi design.
- l. Modulus of Rupture, ASTM D4761: 3280 psi ultimate, 500 psi design.
- m. Ultimate strength values are not meant for design analysis. Design values are for temperatures up to 125 degree F (52 degree C).

2.04 ACCESSORIES

A. Fascia Boards

- 1. Product: Trex Fascia.

B. Composite Decking Color: As selected by Architect.

C. Accessory Hardware:

- 1. Fasteners: As provided by manufacturer

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions for tongue and groove installation, approved submittals, and in proper relationship with adjacent construction.
- B. Cut, drill, and rout using carbide tipped blades.
- C. Do not use composite wood material for structural applications.
- D. Install pedestals as shown on Drawings, and in accordance with manufacturer's instructions.

3.04 CLEANING

- A. Cleaning as required by manufacturer for warranty compliance.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 06 15 00

SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Wall sheathing.
 2. Roof sheathing.
 3. Composite nail base insulated roof sheathing.
 4. Subflooring.
 5. Underlayment.
 6. Building paper.
 7. Building wrap.
 8. Sheathing joint-and-penetration treatment.
 9. Flexible flashing at openings in sheathing.

1.2 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.
- B. Research/Evaluation Reports: For the following:
1. Preservative-treated plywood.
 2. Fire-retardant-treated plywood.
 3. Foam-plastic sheathing.
 4. Building wrap.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria":
1. Plywood.
 2. Oriented strand board.
 3. Fiberboard wall sheathing.

4. Particleboard underlayment.
5. Hardboard underlayment.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: DOC PS 1.

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPAC9.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat all plywood, unless otherwise indicated.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Comply with performance requirements in AWPAC27.
 1. Use Exterior type for exterior locations and where indicated.
 2. Use Interior Type A, High Temperature (HT) for roof sheathing and where indicated.
 3. Use Interior Type A, unless otherwise indicated.
- B. Kiln-dry material after treatment to a maximum moisture content of 15 percent.
- C. Identify fire-retardant-treated plywood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Application: Treat all plywood, unless otherwise indicated.

2.4 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior, Structural I sheathing.
- B. Paper-Surfaced Gypsum Wall Sheathing: ASTM C 79/C 79M or ASTM C 1396/C 1396M, gypsum sheathing; with water-resistant-treated core.

1. Type and Thickness: Regular, 1/2 inch thick.

2.5 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing.
- B. Oriented-Strand-Board Roof Sheathing: [Exposure 1, Structural I] [Exposure 1] sheathing.

2.6 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Combination Subfloor-Underlayment: DOC PS 1, Exposure 1, Structural I, Underlayment single-floor panels.
- B. Plywood Subflooring: Exterior, Structural I single-floor panels or sheathing.
- C. Plywood Underlayment for Resilient Flooring: DOC PS 1, Exposure 1 Underlayment with fully sanded face.
- D. Plywood Underlayment for Ceramic Tile: DOC PS 1, Exterior, C-C Plugged, not less than 5/8-inch nominal thickness, for ceramic tile set in epoxy adhesive.
- E. Plywood Underlayment for Carpet: DOC PS 1, Exposure 1, Underlayment.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated.
 1. For wall and roof sheathing panels, provide fasteners with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

2.8 WEATHER-RESISTANT SHEATHING PAPER

- A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.
- B. Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap.
 - b. DuPont (E. I. du Pont de Nemours and Company); Tyvek.
 - c. Ludlow Coated Products;
 - d. Pactiv, Inc.; GreenGuard
 - e. Raven Industries Inc.; Rufco-Wrap.
 - f. Reemay, Inc.; Typar HouseWrap.

3. Water-Vapor Permeance: Not less than 125 g through 1 sq. m of surface in 24 hours per ASTM E 96, Desiccant Method (Procedure A).

- C. Building-Wrap Tape: Tape recommended by building-wrap manufacturer.

2.9 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Paper-Surfaced Gypsum Sheathing Board: Elastomeric silicone joint sealant recommended by sheathing manufacturer.

2.10 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use indicated by manufacturers of both adhesives and panels.
 1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Securely attach to substrate by fastening as indicated, complying with the following:
 1. NES NER-272 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that exclude exterior moisture.
- C. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30S, "Engineered Wood Construction Guide."
- B. Fastening Methods: Fasten panels as indicated below:
 1. Combination Subfloor-Underlayment:
 - a. Glue and screw to wood framing.

- b. Screw to cold-formed metal framing.
- 2. 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.
- 3. Underlayment:
 - a. Nail to subflooring.

3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to wood framing with screws.
 - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 3. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 4. Install boards with a 1/4-inch gap where they abut masonry or similar materials.

3.4 WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION

- A. General: Cover sheathing with weather-resistant sheathing paper 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.
- B. Building Paper: Apply horizontally with a 2-inch overlap and a 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails.
- C. Building Wrap: Comply with manufacturer's written instructions.
 - 1. Seal seams, edges, fasteners, and penetrations with tape.
 - 2. Extend into jambs of openings and seal corners with tape.

3.5 SHEATHING JOINT-AND-PENETRATION TREATMENT

- A. Seal sheathing joints according to sheathing manufacturer's written instructions.
 - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Seal other penetrations and openings.
 - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed tape in sealant. Apply sealant to exposed fasteners. Seal other penetrations and openings.

3. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

3.6 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturers written instructions.
 1. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.
 2. Lap flashing over weather-resistant building paper at bottom and sides of openings.
 3. Lap weather-resistant building paper over flashing at heads of openings.
 4. After flashing has been applied, roll surfaces with a hard rubber or metal roller.

3.7 PROTECTION

- A. Paper-Surfaced Gypsum Sheathing: Protect sheathing by covering exposed exterior surface of sheathing with weather-resistant sheathing paper securely fastened to framing. Apply covering immediately after sheathing is installed.

END OF SECTION 06 16 00

SECTION 06 16 00
SILL SEALER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Self-Adhesive Air and Moisture Sill Barrier.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00: Rough Carpentry

1.03 REFERENCE STANDARDS

- A. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

1.04 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures for submittal procedures.
- B. Product Data.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of type specified, with minimum 3 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
- D. Store away from excessive heat and sources of ignition

1.07 WARRANTY

- A. See Section 01 77 00 - Closeout Procedures for additional warranty requirements.
- B. Manufacturer Warranty: Provide lifetime manufacturer warranty for sill sealer. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 PERFORMANCE CRITERIA

- A. Flash point: > 320 degrees F (160 degrees C)
- B. Bulk density: 15.723 lb/gal
- C. Specific gravity: 1.883
- D. Melting point (softening point): 220 degrees F (104 degrees C)
- E. VOC content: 0%

2.02 MANUFACTURERS

- A. Basis of Design: ProtectoWrap Energy Sill Sealer.
- B. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Source Limitations: Furnish products produced by single manufacturer and obtained from single supplier.

2.03 COMPONENTS

- A. Description:
 - 1. Sill Sealer: 3/8" (9.5 mm) thick, peel-and-stick, closed cell foam membrane.
 - 2. Primer: As recommended by manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

- A. Surfaces should be clean, dry, free of dirt and other foreign matter. Remove any rough or jagged edges. There should be no solvent based caulks used in conjunction with Triple Guard.

3.02 INSTALLATION

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

END OF SECTION 06 16 00

SECTION 06 16 43
GYPSUM SHEATHING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
 - 2. Sheathing penetration treatment.

1.02 RELATED REQUIREMENTS

- A. Section 05 40 00 - Cold-Formed Metal Framing.
- B. Section 07 25 00 - Weather Barriers.

1.03 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.04 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site. Review requirements for flashing, including surface preparation specified under other Sections, substrate condition and any pretreatment, special details, installation procedures, inspections, protection and repairs.

1.05 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.
- B. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, and directions for storing.
- C. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by flashing manufacturer.
- D. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- E. Protect stored materials from direct sunlight.

1.06 WARRANTY

- A. Material Warranty: Provide sheathing manufacturer's standard warranty covering sheathing material for five years commencing on date of purchase by Contractor.

- B. Weathering Warranty: Provide sheathing manufacturer's standard warranty covering in-place exposure damage for six months commencing on date of purchase by Contractor.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

2.02 WALL SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corporation; GlasRoc.
 - b. G-P Gypsum Corporation; Dens-Glass Gold.
 - c. National Gypsum Co.; Gold Bond eXP.
 - d. Temple-Inland Inc.; GreenGlass
 - e. United States Gypsum Co.; Securock.
 - 2. Types and Thickness:
 - a. Type X, 5/8 inch thick for typical application, unless noted otherwise.
 - 3. Size: 48 by 96 inches or 48 by 108 inches or 48 by 120 inches for vertical installation.

2.03 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.

- D. Screws for Fastening Gypsum Sheathing to Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

2.04 SHEATHING PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
 - 1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing penetrations in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine framing; verify that framing and furring members to receive sheathing do not vary more than 1/8 inch vertically and horizontally from outside face of adjacent members.
- B. Ensure through-wall flashing indicated to be installed prior to installation of sheathing is properly anchored and of proper size.

3.02 WALL SHEATHING 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. Coordinate location and installation of flashing which penetrates and is attached behind sheathing. Install portions of sheathing beneath flashing as shown on the Drawings.
- C. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- D. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

- E. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- 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.

3.03 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to metal framing with screws.
 - 2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 3. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Vertical Installation: Install board vertical edges centered over studs; horizontal installation is not acceptable. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- D. Seal penetrations according to sheathing manufacturer's written instructions.

END OF SECTION 06 16 43

SECTION 06 17 53 - PREFABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

- A. Prefabricated wood trusses, including temporary and permanent bracing, shall be designed, fabricated and erected in accordance with "Design Specification for Metal Plate Connected Wood Trusses" of the Truss Plate Institute. Manufacturer must be a current member of the Truss Plate Institute.
- B. Submittals of Shop Drawings: Complete shop and erection drawings shall be furnished to the Architect for review. Shop drawings shall contain the following information for each type and size of truss assembly to be provided: detail of truss, species, size and grade of lumber used; all temporary and permanent bracing and their connections, field splice details, and connector plate sizes and orientation. Submit one (1) electronic print for review and comment.
- C. Review of shop drawings by the Architect will be for General Compliance with Contract Documents. No responsibility will be assumed by the Architect for the design, correctness of dimensions, quantities or details.
- D. Design Computations: Design computations shall be furnished for Architect's records.
- E. Shop drawings and computations shall bear the seal of Civil Engineer with Louisiana registration and certification that the trusses are designed in accordance with the specifications of the Truss Plate Institute and all applicable codes.
- F. Wood Treatment Data: Submit chemical treatment manufacturer's instructions for handling, storing, installation and finishing of treated material.
 - 1. Preservative Treatment: For each type specified, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained and conformance with applicable standards.
 - 2. For water-borne treatment include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.

1.2 PRODUCT HANDLING

- A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.
 - 1. For trusses pressure treated with waterborne chemicals, sticker between each course to provide air circulation.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. All lumber used in the fabrication of trusses shall be stress-graded and shall be of the species, size and grade specified in the truss design.
- B. Connector plates shall be hot-dip galvanized structural steel conforming to ASTM A653, Class G185 with 1.85 ounces of zinc coating per square foot minimum. Both plate width and plate length must equal or exceed that specified in the truss design and shop drawings.
- C. Fastenings: Nails shall be hot-dipped galvanized conforming to ASTM A153 or stainless steel 304 or 316 nails. Aluminum carbon steel nails shall not be used.

2.2 DESIGN

- A. The trusses shall be detailed to fit the dimensions sized for all dead, live, wind, and seismic loads indicated and/or shown on the plans and prescribed by the New Orleans Building Code. All loads resulting from mechanical, electrical, or other utility work shall be incorporated in the design.

2.3 FABRICATION

- A. See Article 1.1 "QUALITY ASSURANCE".
- B. Trusses shall be fabricated in accordance with the truss design from accurately cut wood members clamped in rigid fixtures during assembly to ensure tight fitting joints and uniformity in completed truss units.
- C. Connector plates are to be pressed into the wood members on both sides of the truss at each joint so that full penetration of the teething is obtained without crushing the outer surface of the wood.

2.4 PRESERVATIVE TREATMENT

- A. User Specification: AWP A U1-05, Commodity Specification A, Use Category UC2, Retention 0.28 pcf SBX.
- B. Treatment Standard: AWP A T1-05, Commodity Requirements 8.1, Penetration 2.5 inches or 85% of sapwood.
- C. Preservative Standard: AWP A P5-05, Borate Oxide (SBX).
- D. Solution for Brush Treatment: Inorganic Boron having a minimum concentration of 1.5% (B₂O₃ basis).

PART 3 - EXECUTION

3.1 HAULING AND INSTALLATION

- A. See Article 1.1 "QUALITY ASSURANCE".
- B. Exercise care at all times to avoid damage to trusses due to careless handling during storage, delivery, unloading and installation. Trusses shall be kept off the ground

and stored properly.

- C. Trusses shall be installed plumb, adequately braced, in the proper orientation, and at the spacing specified in the truss design and erection drawings.
- D. Cutting of truss members or field alteration of any trusses is not permitted.
- E. Make field splices in accordance with details on the erection drawings.

END OF SECTION 06 17 53

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items including, but not necessarily limited to the following:
 - 1. Custom booth seating and carrels.
 - 2. Wood base.
 - 3. Wood door frames, glazed frames.
 - 4. Wood casings, moldings and trim.
 - 5. Upholstery padding.
- B. Hardware and attachment accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 06 41 00 - Architectural Wood Casework: Shop fabricated custom cabinet work.
- C. Section 09 91 23 - Interior Painting: Painting of finish carpentry items.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- C. BHMA A156.9 - Cabinet Hardware; 2020.
- D. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2020.
- E. PS 1 - Structural Plywood; 2009 (Revised 2019).
- F. WDMA I.S. 4 - Industry Specification for Preservative Treatment for Millwork; 2015a.

1.04 SUBMITTALS

- A. Product Data:
 - 1. Provide manufacturer's product data, storage and handling instructions for factory-fabricated units.

- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
 - 2. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- C. Samples: Submit two samples of wood trim 12 inch long.
 - 1. Include documentation indicating that composite wood products and fabrication adhesives contain no urea formaldehyde.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of experience.
 - 1. Single Source Responsibility: Provide and install this work from single fabricator.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.
- B. Protect from moisture damage.
- C. Handle materials and products to prevent damage to edges, ends, or surfaces.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Interior Woodwork Items:
 - 1. Moldings, Bases, Casings, and Miscellaneous Trim: White oak; prepared for opaque finish unless otherwise noted.
 - 2. Door, Glazed Light, and Pocket Door Frames: White oak; prepare for paint finish.
 - 3. Window Sills: Clear fir; prepare for transparent finish.
 - 4. Loose Shelving with exposed edges: White oak; prepared for transparent finish unless otherwise noted.
 - 5. Custom booth seating and carrels with exposed edges: White oak; prepared for transparent finish unless otherwise noted.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless indicated otherwise, and provided it is clean and free of contamination, identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc. (ALSC).

2.03 LUMBER MATERIALS

- A. Softwood Lumber: Poplar or white birch species, plain sawn, maximum moisture content of 6 percent; with flat grain, paint grade.
- B. Hardwood Lumber: White Oak species, plain sawn, maximum moisture content of 6 percent; with vertical grain unless otherwise noted.

2.04 SHEET MATERIALS

- A. Softwood Plywood, Not Exposed to View: Any face species, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.
- B. Softwood Plywood, Exposed to View: Face species as indicated, plain sawn, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.
- C. Hardwood Plywood: Face species as indicated, plain sawn, book matched, medium density fiberboard core; HPVA HP-1 Front Face Grade AA Back Face Grade 1, glue type as recommended for application.
- D. High-Pressure Decorative Stainless Steel Laminate Skin:
 - 1. Products:
 - a. Advanced Technology Incorporated, NuMetal
 - b. Chemetal; 700 series.
- E. Medium Density Fiberboard: ANSI A208.2, Grade MD.
- F. Marine Grade Plywood: Face species Douglas fir or Western larch; veneer core; APA PS-1 Grade A-B; Exterior bond.

2.05 FASTENINGS

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
 - 1. VOC: 70 b/L maximum in accordance with SCAQMD Rule 1168, 2005.
- B. Fasteners: Of size and type to suit application; any finish in concealed locations and stainless steel finish in exposed locations.

2.06 ACCESSORIES

- A. Adhesive: Type recommended by AWI/AWMAC to suit application.
- B. Lumber for Shimming and Blocking: Softwood lumber of pine or fir species.
- C. Primer: Section 09 91 23 - Interior Painting.
- D. Wood Filler: Solvent base, tinted to match surface finish color.
- E. Upholstery padding: Flexible, cellular, molded or slab polyurethane foam, and as follows:
 - 1. Integrated with wood frame.
 - 2. Seat Bases: Minimum four inches thick - 2.7 pound density foam, ILD: 43 minimum
 - 3. Seat Backs: Minimum two inches thick - 2.0 pound density foam, ILD: 24 to 28.

2.07 HARDWARE

- A. Hardware: Comply with BHMA A156.9.
- B. Americans with Disabilities Act (ADA)-Compliant Vanity and Countertop Brackets:
 - 1. Material: Steel.
 - 2. Finish: Manufacturer's standard, factory-applied primer.

2.08 WOOD TREATMENT

- A. Factory-Treated Lumber: Comply with requirements of AWP A U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.
- B. Water Repellent Preservative Treatment by Dipping Method: WDMA I.S. 4, with 0.25 percent retainage.
- C. Shop pressure treat wood materials requiring fire rating to concealed wood blocking.
- D. Provide identification on fire retardant treated material.
- E. Redry wood after pressure treatment to maximum 15 percent moisture content.

2.09 SITE FINISHING MATERIALS

- A. Field Finishing: See Section 09 91 23.

2.10 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.

- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.11 SHOP FINISHING

- A. Apply wood filler in exposed nail and screw indentations.
- B. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- C. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 5, Varnish, Conversion.
 - b. Stain: As selected by Architect.
 - c. Sheen: Satin.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 91 23.
- C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION 06 20 00

SECTION 06 41 00
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Hardware.
- C. Factory finishing.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- C. Section 12 36 00 - Countertops.

1.03 REFERENCE STANDARDS

- A. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2022.
- B. ASTM B927/B927M-17 - Standard Specification for Brass Rod, Bar, and Shapes; 2023.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- E. BHMA A156.9 - Cabinet Hardware; 2020.
- F. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2020.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.

2. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- B. Product Data:
1. Provide data for hardware and accessories.
 2. Include documentation indicating that composite wood products and fabrication adhesives contain no urea formaldehyde.
- C. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet substrate and finish.
- D. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
- E. Samples: Submit two (2) samples, 12 inch by 12 inch minimum, of decorative steel plate material, illustrating surface and applied sealer finish.
1. Include sample seam and corner.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum ten (10) years of experience.
1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
 2. Single Source Responsibility: Provide and install this work from single fabricator.

1.07 MOCK-UPS

- A. Provide mock-up of typical base cabinet, including hardware, finishes, and countertop.
- B. Locate where directed.
- C. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

1.09 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Types WD-1 and WD-5
 - 1. Surfacing Solution Tambour Solid Wood
 - 2. Shape: As scheduled
 - 3. Stain: As scheduled
 - 4. Dimensions: As shown on Drawings
- C. Type WD-2
 - 1. Solid Oak
 - 2. Shape: Flat cut
 - 3. Stain: Match control sample
 - 4. Dimensions: As shown on Drawings
- D. Type WD-4
- E.
 - 1. Painted as scheduled
 - 2. Dimensions: As shown on Drawings
- F. Type WD-6:
 - 1. Solid Oak
 - 2. Stain: Match control sample
 - 3. Dimensions: As shown on Drawings.
- G. Wood Veneer Faced Cabinets, Type WD-3:
 - 1. Exposed Surfaces indicated to have a clear coat finish: HPVA Grade A, American cypress, plain sliced, pleasing-matched. Seal all exposed edges.
 - a. Stain to match Architect's sample and match countertop material specified in Section 12 36 00 - Countertops.

2. Semi-Exposed Surfaces: HPVA HP-1 Grade B, American cypress, plain sliced, random-matched.
3. Concealed Surfaces: Fabricator's option subject to Architect's approval.

H. Cabinets and doors:

1. Finish - Exposed Exterior Surfaces: Wood veneer, with edge banding to match.
2. Finish - Exposed Interior Surfaces: Wood veneer.
3. Finish - Concealed Surfaces: Fabricator's option subject to Architect's approval.
4. Casework Construction Type: Type A - Frameless.
5. Interface Style for Cabinet and Door: Style 1 - Overlay; flush overlay.
6. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
 - a. Custom Grade: Doors, drawer fronts and false fronts wood grain to run and match vertically within each cabinet unit.
7. Adjustable Shelf Loading: 50 lbs. per sq. ft.
 - a. Deflection: L/144.
8. Cabinet Style: Flush overlay.
9. Cabinet Doors and Drawer Fronts: Flush style.
10. Drawer Construction Technique: Dovetail joints.

2.02 WOOD-BASED COMPONENTS

- A. Provide sustainably harvested wood, certified or labeled; see Section 01 60 00.
- B. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless otherwise noted, provided it is clean and free of contamination; identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc.
- C. Edgebanding, where applicable: Use solid wood edgebanding matching species, color, grain, and grade for exposed portions of cabinetry.

2.03 PANEL CORE MATERIALS

- A. Medium Density Fiberboard (MDF): Composite panel composed of cellulosic fibers, additives, and bonding system; cured under heat and pressure; comply with ANSI A208.2.

2.04 HARDWOOD PLYWOOD PANELS

- A. Hardwood Plywood: Plywood manufactured for nonstructural decorative applications; consisting of faces and backs applied to a variety of core types; comply with HPVA HP-1.
 - 1. Woodwork Quality Standard: Panels complying with specified woodwork quality standard.

2.05 DECORATIVE METAL

- A. Steel Plate: ASTM B927/B927M-17 Brass.
 - 1. Thickness: As shown on Drawings
 - 2. Color: As selected by Architect.
 - 3. Finish: Satin

2.06 COUNTERTOPS

- A. Countertops: See Section 12 36 00.

2.07 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application containing no urea formaldehyde.
 - 1. VOC: 70 g/L maximum in accordance with SCAQMD Rule 1168, 2005.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel finish in exposed locations.
- D. Grommets: Standard rubber grommets for cut-outs, in color to blend with adjacent surface.

2.08 HARDWARE

- A. Hardware: BHMA A156.9, types as indicated for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, satin chrome finish, for nominal 1 inch spacing adjustments.
- C. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, brass metal.
- D. Cabinet Catches and Latches:
 - 1. Type: Friction catch.
- E. Drawer Slides:

1. Type: Full extension.
 2. Static Load Capacity: Heavy Duty grade.
 3. Mounting: Side mounted.
 4. Stops: Integral type.
 5. Features: Provide self closing/stay closed type.
- F. Hinges: European style concealed self-closing type, steel with satin finish.
- G. Soft Close Adapter: Concealed, frame-mounted, screw-adjustable damper; steel with satin finish.

2.09 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
1. Provide pleasing matched panels at exposed surfaces.
- E. Decorative Metal Plate:
1. Fabricate sections in single pieces where practicable; minimize panel seams.
 2. Finish exposed edges to match face of plate.
 3. Use concealed fasteners or adhesive where possible. Where exposed fasteners are used, countersink flush with face of plate and finish to match.
 4. Grind welds flush and finish to match face of plate.
 5. Corner Seams: Open joint, no overlap. Leave maximum 1/16 inch gap for thermal expansion.
 6. Panel Seams: Open joint. Leave maximum 1/16 inch gap for thermal expansion.

2.10 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.

- B. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
- C. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 11, Polyurethane, Catalyzed.
 - b. Stain: As selected by Architect.
 - c. Sheen: Satin unless otherwise indicated in the drawings.
 - 2. Opaque:
 - a. System - 11, Polyurethane, Catalyzed.
 - b. Color: As selected by Architect.
 - c. Sheen: Semigloss.

2.11 UPHOLSTERED CUSTOM SEATING

- A. Exposed finish surfaces for wood portions of benches shall be plywood veneers and lumber of species previously specified in Part 2 - Materials.
- B. Fabric for seats and backs shall be as indicated in the drawings.
- C. Benches and booth seating shall include complete construction consisting of all necessary components including, but not necessarily limited to, foam, dacron liners, specified upholstery, stain resistant upholstery applications, wood veneer products, and lumber frame.
 - 1. Cushions shall be removable for cleaning with tamper resistant system to secure in place during normal usage; coordinate with Architect in shop drawing phase.
 - 2. Foam for seating shall be high density polyurethane foam with a high resiliency; High quality foam to have a minimum density of 2.8 lb./cu. ft. with a 35 lb. ILD.
 - a. Submit foam product data and a 8 inch square of the foam for the Architect's approval.
 - b. Foam shall have low VOC admissions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- F. Secure cabinets to floor using appropriate angles and anchorages.
- G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

- A. Test installed work for rigidity and ability to support loads.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION 06 41 00

SECTION 07 08 10
BUILDING AIRTIGHTNESS REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Administration and Coordination of Air Barrier System (ABS) Installation.
2. Building Airtightness Testing & Inspection.

1.02 RELATED REQUIREMENTS

- A. Section 01 40 00 - QUALITY REQUIREMENTS: For administrative and procedural requirements of testing and inspections.
- B. Division 07 Sections for air-barrier materials and specific quality control requirements for individual construction activities.

1.03 DEFINITIONS

- A. Air Barrier System (ABS): The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.04 PERFORMANCE REQUIREMENTS

- A. The installed ABS shall conform to the following requirements:
 1. Building Air Leakage Rate: The air leakage rate of the building exterior envelope shall not exceed 0.25 cfm/ft² at a pressure differential of 0.3" w.g. (1.57 psf or 75 Pa) in accordance with ASTM E779-03.
 2. ABS must be continuous, with all joints made air and water tight.
 3. Structural Integrity: ABS shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure.
 4. ABS shall not displace adjacent materials under full load.
 5. ABS shall be joined in an air-tight, watertight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep.

1.05 REFERENCES

- A. ASTM International (ASTM)

1. ASTM E779 - Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.
2. ASTM E1186 - Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.
3. ASTM E1827 - Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door.
4. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

B. International Organization For Standardization (ISO)

1. ISO 6781 - Thermal Insulation - Qualitative Detection of Thermal Irregularities in Building Envelopes Infrared Method, First Edition.

1.06 SUBMITTALS

A. Qualification Data: Submit the qualifications of the building airtightness testing firm and include the following:

1. List of the last 5 airtightness testing projects conducted including names and contact information of the clients.
2. Copies of reports on the last 3 building airtightness tests performed.
3. List of references with contact information and relationship.
4. Listing of each piece of equipment, including manufacturer, model number, date of last certification.

B. Test Report(s): Submit not later than 10 days after each test.

1. Report Data: Written reports of each inspection and test or similar service shall include all the Report items described in ASTM E1827. Additionally, the report shall include the following information:
 - a. Date of Issue
 - b. Project title and number
 - c. Name, address, and telephone number of testing agency
 - d. Dates and locations of samples and tests or inspections
 - e. Names of individuals making the inspection or test
 - f. Designation of the Work and test method.

- g. Identification of product and Specification Section
- h. Complete inspection or test data
- i. Test results and an interpretation of test results
- j. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements
- k. Name and signature of test technician
- l. Recommendations for retesting

1.07 QUALITY ASSURANCE

A. Airtightness Testing Firm & Equipment:

- 1. The testing firm shall have documented experience accomplishing air barrier performance testing using fan pressurization methods in accordance with ASTM E779 and E1827 on building of similar size, construction and complexity.
 - a. Demonstrate a thorough working knowledge and understanding of building construction, and in particular exterior envelope systems and HVAC systems.
 - b. Be experienced in diagnostic evaluation of the air barrier performance in accordance with ASTM E1186.
 - c. Thermographer: Meet the following minimum requirements:
 - 1) Level I or Level II Thermographer with education and thermography work experience and having completed application specific training for the use of IR thermography in Building Science.
 - 2) Thermographer must have the following abilities as developed through both training and experience:
 - (a) Thorough knowledge of the operation of the particular infrared imaging system being used.
 - (b) Ability to interpret thermograms and other data used in air barrier testing.
 - (c) Ability to confirm the test conditions are within set limits and are consistent with assumptions that support the interpretation.
 - d. Test Equipment:
 - 1) Blower Fans: Calibrated units capable of both pressurizing and depressurizing the building at various different pressure levels to a maximum pressure of 75 Pa; units shall have been calibrated by an authorized calibration test facility within the previous 12 months.

- 2) Infrared Camera: The infrared imaging system must be radiometric with a minimum Noise Equivalent Temperature Difference (NETD), which is a measurement of thermal resolution or sensitivity, of less than 80mK at 25°C.
- 3) If temperatures are being measured, the parameters (i.e. emissivity, atmospheric temperature, etc.) shall be capable to be adjusted in the camera or by using software. Camera calibration records shall be available upon request.
- 4) The infrared imaging system must have an operating spectral range that falls between 2 and 14 micrometers (pm).
 - (a) The imaging system must have a means of recording radiometric images seen on the camera's screen.
 - (b) The camera's detector array must have no fewer than 320 x 240 pixels.

PART 2 – PRODUCTS

2.01 AIR BARRIER SYSTEM

- A. Provide materials and installation methods to bridge and provide an airtight connection/seal conforming to the Performance Requirements specified in this Section at the following air leakage pathways and gaps:
 1. Between the exterior wall air barriers and the roof air barrier.
 2. Between the exterior wall air barriers and the slab.
 3. Between different substrate materials/systems.
 4. Between the various different air barrier products/systems.
 5. At control joints.
 6. Between the wall air barrier and window frames, storefront frames, and other openings.
 7. Between the wall air barrier and door frames.
 8. Between the air barrier and any penetrations, including penetrations by piping, conduit, duct, structural members and similar.
 9. Masonry ties, screws, bolts and similar penetrations.
 10. All other air leakage pathways in the building air barrier envelope.
- B. Individual air barrier materials may include those specified in the following Sections:
 1. Division 07 Section “Thermal Insulation.”
 2. Division 07 Section "Weather Barriers".

3. Division 07 Section "Joint Sealants."

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Furnish and install the various different types of air barriers shown and specified to create an Air Barrier System (ABS) covering the entire building envelope constructed to perform as a continuous barrier that will remain adhered in place and durable for the life of the building.
 - 1. ABS shall accommodate movements of building materials by providing for airtight barrier across any building expansion and control joints that may be discovered but not represented on the drawings.
 - 2. ABS shall accommodate changes in substrate and perimeter sealing conditions.
 - 3. Different air barrier products shall be permanently joined together where they meet in a manner approved by both manufacturers to provide an airtight juncture.

3.02 FIELD QUALITY CONTROL

- A. Review the air barrier system installation in progress on a daily basis and confirm the following:
 - 1. Air barrier manufacturer's surface preparation and installation instructions are being followed.
 - 2. Temperature and site conditions conform to manufacturer's requirements.
 - 3. Site conditions for application temperature, and dryness of substrates are within guidelines.
 - 4. Continuity of the air barrier system over the entire building with no gaps and all penetrations are sealed allowing for no air infiltration or exfiltration through the air barrier system.
 - 5. Air barrier substrates are continuous and will structurally support the air barrier system to withstand design air pressures.
 - 6. Substrate surfaces are properly primed as recommended by manufacturer.
 - 7. Laps in materials conform to manufacturer's instructions and in no case are less than 3 inches and are shingle-lapped to shed water to exterior side.
 - 8. Mastic is applied on exposed edges of self-adhered membrane air barriers and elsewhere as recommended by manufacturer.
 - 9. Installer is using a roller to achieve/enhance adhesion of self-adhered membranes.

10. Application thickness of liquid-applied materials over the entire surface conform with manufacturer's specifications for the specific substrate.
11. Correct materials are installed for compatibility.
12. Manufacturer recommended transitions are being employed for change in direction and structural support at gaps.
13. Review connection between assemblies (membrane and sealants) for proper cleaning, preparation and priming of surfaces, structural support, integrity and continuity of seal.
14. Air barrier system is not exposed to the weather longer than recommended by the barrier manufacturer.
15. Test and record the bond strength of coatings and self-adhered membranes to substrate in accordance with ASTM D4541.

3.03 BUILDING AIRTIGHTNESS TEST

- A. A qualified testing firm shall conduct a test of the building for air tightness using calibrated portable blowers in accordance with ASTM E1827 or ASTM E779 and calculate the building air leakage rate. This test is intended to demonstrate that the building construction has produced an effective air barrier so that air infiltration and exfiltration through the exterior building envelope conform to performance requirements specified herein.
 1. The test shall be performed when the building envelope is enclosed and prior to the installation of finishes, including gypsum board.
 2. Notify the Architect at least 48 hours prior to the Building Air Tightness Test. A representative of the Architect will witness the test and record test readings.
 3. Prior to the test, submit evidence that the test equipment has been calibrated within the past two years.
 4. The measuring instruments used in the tests shall be digital meters, not analog gages. Tests shall be performed when the wind speed is less than 10 mph, and no rain.
 5. The following conditions will be observed in the building during the testing:
 - a. Exterior doors and windows shall be closed.
 - b. Interior doorways including stairway doors shall be open.
 - c. HVAC systems shall be de-energized.
 - d. Appliances shall be de-energized.
 - e. Plumbing traps shall be primed.

- f. Follow the Recommended Test Envelope conditions in ASTM E1827, Table 1, for the Closed Envelope condition.
- g. Test the building air leakage rate by pressurizing the building relative to the exterior environment at twelve pressures up to at least 0.30 inches water gauge (1.57 psf or 75 Pa) and record the results at each step in pressure increase.
- h. Test the building air leakage rate by depressurizing the building negatively relative to the exterior environment at twelve pressures up to at least -0.30 inches water gauge (1.57 psf or -75 Pa) and record the results; compare the results to the positive test.
 - 1) Where differences of 10% or more exist between the positive and negative pressure tests, investigate the causes and correct/resolve the reasons for the differences and then retest the building.
- i. If the building fails to meet the acceptable leakage rate specified under performance criteria herein, use techniques described in ASTM E1186 to locate the leak sources, then correct the deficiencies in the building construction, then retest.
 - 1) Fog/smoke agents used to identify leaks shall be the non-toxic type.
- j. For each test, take a minimum of 12 readings at various pressures and air flows within the range of the calibrated equipment.
 - 1) In the test report, test points shall be shown in graphical form on a log-log scale with pressure in inches water column displayed on the horizontal axis and flow in cfm displayed on the vertical axis.
 - 2) The results of each test conducted shall be included in the report whether successful or not.

3.04 THERMOGRAPHY INSPECTION

- A. While the airtightness testing is being conducted and building is being positively or negatively pressurized, the building envelope shall be inspected by a qualified Thermographer using an infrared camera conforming to requirements specified herein.
 - 1. Any areas where evidence of air leakage is observed coming through the building envelope shall be noted and both standard and infrared photos taken to record the location/condition. Use smoke tracer to positively confirm sources of air leakage.
- B. Report: Include a summary of the areas/conditions where air leakage was observed in the building envelope along with the standard and infrared photo images taken.
- C. In the event that the building exceeds the specified air leakage rate, the building envelope shall be inspected by the Thermographer during each subsequent airtightness test that is conducted and shall be used to demonstrate and provide digital infrared photo record showing that the areas of air leakage have been corrected.

3.05 REPAIR AND PROTECTION

- A. Take measures to protect the air barrier system from damage during construction.
- B. Damaged air barriers shall be repaired as recommended by manufacturer by the air barrier installer prior to cover.
- C. After completion of the building and upon completion of inspection and testing, restore/repair any removed/damaged construction caused by finding and repairing leaks in the air barrier system and restore substrates, insulation and finishes to their original condition.

END OF SECTION 07 08 10

SECTION 07 11 13
BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Bituminous dampproofing.
- B. Protection boards.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011 (Reapproved 2016).
- B. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013, with Editorial Revision (2019).
- C. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2007 (Reapproved 2018).
- D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).

1.04 SUBMITTALS

- A. Product Data: Provide properties of primer, bitumen, and mastics.
- B. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with at least three years of experience.

1.06 FIELD CONDITIONS

- A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers:

1. Karnak Corporation: www.karnakcorp.com/#sle.
2. Mar-Flex Systems, Inc: www.mar-flex.com/#sle.
3. W. R. Meadows, Inc: www.wrmeadows.com/#sle.

2.02 BITUMINOUS DAMPPROOFING

- A. Bituminous Dampproofing Prime Coat: Cold-applied, spray-grade; asphalt base, volatile petroleum solvents, and other content, suitable for application by spray, brush, roller, or squeegee; asbestos-free; suitable for application on vertical and horizontal surfaces.
 1. Composition: ASTM D4479/D4479M Type I, asbestos free.
 2. VOC Content: Not more than permitted by local, State, and federal regulations.
- B. Bituminous Dampproofing Top Coat: Cold-applied, trowel-grade; asphalt base, volatile petroleum solvents, and other content, suitable for application by trowel on vertical and horizontal surfaces.
 1. Composition: ASTM D4586/D4586M Type I, asbestos free.
 2. VOC Content: Not more than permitted by local, State, and federal regulations.
- C. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

2.03 BITUMEN MATERIALS

- A. Cold Asphaltic Type:
 1. Bitumen: Emulsified asphalt, ASTM D1227/D1227M, unreinforced, Type III, Class 1 or 2.
 2. Asphalt Primer: ASTM D41/D41M, compatible with substrate.

2.04 ACCESSORIES

- A. Protection Board: 1/2 inch thick bitumen impregnated glass fiberboard.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.
- C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

3.02 PREPARATION

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

3.03 APPLICATION

- A. Foundation Walls: Apply two coats of asphalt dampproofing as follows:
 - 1. Apply prime coat at approximately 70-100 sq ft/gal.
 - 2. Apply top coat at approximately 20-25 sq ft/gal.
- B. Apply bitumen by mop, roller, or trowell.
- C. Apply from 2 inches below finish grade elevation down to top of footings.
- D. Seal items watertight with mastic, that project through dampproofing surface.
- E. Place protection board directly over dampproofing, butt joints, and adhere to tacky dampproofing.
- F. Scribe and cut boards around projections, penetrations, and interruptions.

END OF SECTION 07 11 13

SECTION 07 14 13
HOT FLUID-APPLIED RUBBERIZED ASPHALT WATERPROOFING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Rubberized-asphalt waterproofing membrane , reinforced.
2. Molded-sheet drainage panels.
3. Insulation.

1.02 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review waterproofing requirements, including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining waterproofing, and other termination conditions.
- C. Samples: For plaza-deck pavers, full sized in each color and texture required.

1.04 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Sample Warranties: For special warranties.

1.05 QUALITY ASSURANCE

- A. Mockups: Install waterproofing to 100 sq. ft. (9.3 sq. m) of deck to demonstrate surface preparation, crack and joint treatment, corner treatment, thickness, texture, and execution quality. Install pavers and paver supports to demonstrate aesthetic effects, and set quality standards for materials and execution.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.
- B. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- C. Protect stored materials from direct sunlight.

1.07 FIELD CONDITIONS

- A. Weather 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, or when temperature is below zero deg F (minus 64.4 degrees Fahrenheit).
 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.08 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace waterproofing and sheet flashings that do not comply with requirements or that fail to remain watertight within specified warranty period.
 1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pedestal-mounted pavers on plaza decks.
 2. Warranty insulation retains 80 percent of original published thermal value.
 3. Warranty pavers do not dish or warp and do not crack, split, or disintegrate in freeze-thaw conditions.
 4. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Installer's Warranty: Specified form signed by Installer, covering Work of this Section, for warranty period of two years.
 1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pedestal-mounted pavers on plaza decks.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Obtain waterproofing materials sheet flashings, protection course, molded-sheet drainage panels, insulation, pavers, and pedestals from single source from single manufacturer.

2.02 WATERPROOFING MEMBRANE

- A. Hot Fluid-Applied, Rubberized-Asphalt Waterproofing Membrane: Single component; 100 percent solids; hot fluid-applied, rubberized asphalt.
 - 1. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. American Hydrotech, Inc.
 - b. Soprema.
 - 2. Basis-of-Design Product: American Hydrotech, Inc.; Monolithic Membrane 6125.

2.03 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with waterproofing.
- B. Primer: ASTM D 41/D 41M, asphaltic primer.
- C. Elastomeric Sheet: 50-mil- (1.3-mm-) minimum, uncured sheet neoprene with manufacturer's recommended contact adhesives as follows:
 - 1. Tensile Strength: 1400 psi minimum; ASTM D 412, Die C.
 - 2. Elongation: 300 percent minimum; ASTM D 412.
 - 3. Tear Resistance: 125 psi minimum; ASTM D 624, Die C.
 - 4. Brittleness: Does not break at minus 30 degrees Fahrenheit; ASTM D 2137.
- D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum termination bars; approximately 1 by 1/8 inch (25 by 3 mm) thick; with stainless-steel anchors.
- E. Sealants and Accessories: Manufacturer's recommended sealants and accessories.
- F. Reinforcing Fabric: Manufacturer's recommended, spun-bonded polyester fabric.
- G. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 - 1. Thickness: 1/4 inch, nominal.

2.04 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, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm/ft. (112 to 188 L/min. per m).

2.05 INSULATION

- A. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C 578, Type VII, 60-psi (414-kPa) minimum compressive resistance, square edged.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. DiversiFoam Products; CertiFoam 60.
 - b. Dow Chemical Company (The); Highload 60.
 - c. Owens Corning; Foamular 604.

PART 3 - EXECUTION

3.01 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. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 - 2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean and prepare substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- D. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.
- E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, and other voids.

3.03 JOINTS, CRACKS, AND TERMINATIONS

- A. Prepare and treat substrates to receive waterproofing membrane, including joints and cracks, deck drains, corners, and penetrations according to manufacturer's written instructions.
 1. Rout and fill joints and cracks in substrate. Before filling, remove dust and dirt according to ASTM D 4258.
 2. Adhere strip of elastomeric sheet to substrate in a layer of hot rubberized asphalt. Extend elastomeric sheet a minimum of 6 inches on each side of moving joints and cracks or joints and cracks exceeding 1/8 inch thick, and beyond deck drains and penetrations. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.
 3. Embed strip of reinforcing fabric into a layer of hot rubberized asphalt. Extend reinforcing fabric a minimum of 6 inches on each side of nonmoving joints and cracks not exceeding 1/8 inch thick, and beyond roof drains and penetrations.
 - a. Apply second layer of hot fluid-applied, rubberized asphalt over reinforcing fabric.
- B. At expansion joints and discontinuous deck-to-wall or deck-to-deck joints, bridge joints with elastomeric sheet extended a minimum of 6 inches on each side of joints and adhere to substrates in a layer of hot rubberized asphalt. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.

3.04 FLASHING INSTALLATION

- A. Install elastomeric sheets at terminations of waterproofing membrane according to manufacturer's written instructions.
- B. Prime substrate with asphalt primer.
- C. Install elastomeric sheet and adhere to deck and wall substrates in a layer of hot rubberized asphalt.
- D. Extend elastomeric sheet up walls or parapets a minimum of 8 inches above plaza-deck pavers and 6 inches onto deck to be waterproofed.
- E. Install termination bars and mechanically fasten to top of elastomeric flashing sheet at terminations and perimeter of waterproofing.

3.05 MEMBRANE APPLICATION

- A. Apply primer, at manufacturer's recommended rate, over prepared substrate and allow it to dry.
- B. Heat and apply rubberized asphalt according to manufacturer's written instructions.
 - 1. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized asphalt.
- C. Start application with manufacturer's authorized representative present.
- D. Reinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to a thickness of 90 mils; embed reinforcing fabric, overlapping sheets 2 inches; spread another 125-mil- (3.2-mm-) thick layer to provide a uniform, reinforced, seamless membrane 215 mils thick.
- E. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.
- F. Cover waterproofing with protection course with overlapped joints before membrane is subject to construction or vehicular traffic.

3.06 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 methods 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.

3.07 INSULATION INSTALLATION

- A. Install one or more layers of board insulation to achieve required thickness over waterproofed surfaces. Cut and fit to within 3/4 inch of projections and penetrations.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.08 FIELD QUALITY CONTROL

- A. Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions; surface preparation; and application of membrane, flashings, protection, and drainage components; furnish daily reports to Architect.
 - 1. Site representative shall measure membrane thickness with pin tester or other suitable device at least once for every 100 sq. ft. (10 sq. m) and include measurements in reports.

- B. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, waterproofing application, protection, and drainage components, and to furnish reports to Architect.
 - 1. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D 5957, after completing and protecting waterproofing but before overlaying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water. Testing agency shall observe flood testing.
 - a. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of sheet flashings.
 - b. Flood each area for 48 hours.
 - c. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.

3.09 CLEANING AND PROTECTION

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Protect installed board insulation from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 14 13

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at exterior wall behind exterior wall finish.
- B. Batt insulation in exterior assemblies including, but not limited to wall construction.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry.
- B. Section 06 16 43 - GYPSUM SHEATHING.
- C. Section 07 54 23 - Thermoplastic Polyolefin (TPO) Membrane Roofing: Roof insulation.

1.03 REFERENCE STANDARDS

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2019.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- D. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C; 2019a.
- E. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2019.

1.04 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
 - 1. Include documentation that batt insulation is formaldehyde-free.

1.05 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Over Metal Stud Framed Walls, Continuous: Extruded polystyrene (XPS) board.
- B. Insulation in Metal Framed Walls: Batt insulation with no vapor retarder.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: ASTM C578, Type IV; Extruded polystyrene board with either natural skin or cut cell surfaces; with the following characteristics:
 - 1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
 - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
 - 5. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 - 6. Board Edges: Square.
 - 7. Type and Water Absorption: Type XII, 0.3 percent by volume, maximum, by total immersion.
 - 8. Vertical drainage channels.
 - 9. Total Thermal Resistance, R-value: As indicated on the drawings.
 - 10. Products:
 - a. Basis of Design: Owens Corning Corporation; FOAMULAR NGX Type IV Next Generation Extruded: www.ocbuildingspec.com/#sle.
 - b. DuPont de Nemours, Inc: building.dupont.com/#sle.
 - c. Kingspan Insulation LLC: www.kingspan.com/#sle.

2.03 MINERAL FIBER BLANKET INSULATION MATERIALS

- A. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 25 or less when tested in accordance with ASTM E84.
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.

2. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
3. Thickness: 6 inch or as indicated on drawings.
4. Products:
 - a. Johns Manville: www.jm.com/#sle.
 - b. ROCKWOOL (ROXUL, Inc): www.rockwool.com/#sle.
 - c. Thermafiber, Inc: www.thermafiber.com/#sle.

2.04 ACCESSORIES

- A. Flashing Tape: Special reinforced film with high performance adhesive.
 1. Application: Window and door opening flashing tape.
 2. Width: As required for application.
- B. Joint Tape: Polyethylene self-adhering type, mesh reinforced, 2 inch wide.
- C. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.
- D. Wire Mesh: Galvanized steel, hexagonal wire mesh.
- E. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Apply adhesive to back of boards:
 1. Full bed 1/8 inch thick.
- B. Install boards with drainage channels oriented vertically on walls.
 1. Place boards to maximize adhesive contact.
 2. Install in running bond pattern.
 3. Butt edges and ends tightly to adjacent boards and protrusions.

- C. Extend boards over expansion joints, unbonded to wall on one side of joint.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- E. Tape insulation board joints.

3.03 BATT INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in exterior wall, raised floor, and /or soffit spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Retain insulation batts in place with wire mesh secured to framing members.
- F. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
- G. Coordinate work of this section with construction of air barrier seal, see Section 07 25 00.

3.04 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.
- B. Place temporary signs warning workers in areas that contain loose-fill insulated walls to use caution and to prevent loss of insulation when cutting into walls.

END OF SECTION 07 21 00

SECTION 07 21 19
FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Foamed-in-place insulation.
 - 1. In exterior framed walls Type 1.
 - 2. In exterior wall crevices.
 - 3. At junctions of dissimilar wall and roof materials.
 - 4. In underside of roofs and ceilings.
 - 5. In underside of floor decks.
 - 6. At underside of first floor slab; Type 2.
 - 7. At miscellaneous voids as indicated on the Drawings; Type 1.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2019.
- C. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022.
- D. NFPA 275 - Standard Method of Fire Tests for the Evaluation of Thermal Barriers; 2017.
- E. UL 1715 - Standard for Safety Fire Test of Interior Finish Material; Current Edition, Including All Revisions.
- F. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.
- G. FM 4880 - Approval Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials; 2015.
- H. UL 1040 - Standard for Safety Fire Test of Insulated Wall Construction; Current Edition, Including All Revisions.
- I. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2019.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.04 SUBMITTALS

- A. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.
- B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES, or a Product Certification Agency accredited by ICC-ES.
- C. Certificates: Certify that products of this section meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified, with minimum three years experience, and approved by manufacturer.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- C. Thermal Barrier: Exposed foamed-in-place insulation, not otherwise concealed by gypsum board, must be protected with a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275, or complies with UL 1715, UL 1040, NFPA 286 or FM 4880.
- D. Ignition Barrier: Foamed-in-place insulation located in attics and crawl spaces must be protected with a material meeting the requirements of IBC Chapter 26, Article 2603.4.1.6.

1.06 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.

1.07 FIELD CONDITIONS

- A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.
- B. Do not apply foam when temperature is within 5 degrees F of dew point.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Foamed-In-Place Insulation:

1. BASF Corporation: www.spf.basf.com/#sle.
2. Carlisle Spray Foam Insulation: www.carlisesfi.com/#sle.
3. Henry Company: www.henry.com/#sle.
4. Johns Manville: www.jm.com/#sle.

2.02 MATERIALS

- A. Type 1 - Open-Cell Foamed-In-Place Insulation: Low-density, flexible, water vapor permeable polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
 - a. Fire Protection: Provide 15-minute thermal barrier of 1/2 inch gypsum board or equivalent material complying with NFPA 275 test method, or foamed-in-place insulation either exposed or with covering that complies with FM 4880, NFPA 286, UL 1040, or UL 1715.
 2. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and fire protection requirements.
 3. Thermal Resistance: R-value of 3.0, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
 4. Air Permeance: 0.04 cfm per square foot, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf.
 5. Manufacturers:
 - a. BASF Corporation: www.spf.basf.com/#sle.
 - b. Carlisle Spray Foam Insulation: www.carlisesfi.com/#sle.
 - c. Gaco Western: www.gaco.com/#sle.
 - d. Henry Company: www.henry.com/#sle.
 - e. Icynene-Lapolla: www.icynene.com/#sle.
 - f. Johns Manville: www.jm.com/#sle.
- B. Type 2 - Closed-Cell Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
 - a. Fire Protection: Provide 15-minute thermal barrier of 1/2 inch gypsum board or equivalent material complying with NFPA 275 test method, or foamed-in-place insulation either exposed or with covering that complies with FM 4880, NFPA 286, UL 1040, or UL 1715.

2. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and fire protection requirements.
3. Aged Thermal Resistance (R-value): 5 (deg F hr sq ft)/Btu, minimum, when tested at 1 inch thickness in accordance with ASTM C518 after aging for 180 days at 41 degrees F.
4. Water Vapor Permeance: Vapor retarder; 2 perms, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
5. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
6. Air Permeance: 0.04 cfm per square foot, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf.
7. Closed Cell Content: At least 90 percent.
8. Nominal Density of Base Layer: 1.8 lb/cu. ft.

2.03 ACCESSORIES

- A. Primer: As required by insulation manufacturer.
- B. Overcoat:
 1. Underside of Roof Deck: Manufacturer's thermal barrier coating meeting Quality Assurance article.
 2. Underside of Floor Slab: Manufacturer's ignition barrier coating meeting Quality Assurance article.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify work within construction spaces or crevices is complete prior to insulation application.
- B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

3.02 PREPARATION

- A. Mask and protect adjacent surfaces from over spray or dusting.
- B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION, GENERAL

- A. Apply insulation in accordance with manufacturer's instructions.
- B. Apply insulation by spray method, to a uniform monolithic density without voids.

- C. Apply protective coating monolithically, without voids, to fully cover foam insulation, to achieve fire rating required.
- D. Patch damaged areas.
- E. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
- F. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.04 INSTALLATION OF FOAMED-IN-PLACE INSULATION

- A. Spray-Applied Insulation: Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked.
 - 1. Hybrid System: Type 2, Hybrid System shall be comprised of specified manufacturer's base layer covered by the specified manufacturer's top layer sprayed onto the specified substrates as shown on the Drawings.
 - a. Thickness:
 - 1) At Roof Deck: As required to achieve an R-value of 30.
 - 2) At Floor Slab: As required to achieve an R-value of 10.
 - 2. Exterior Framed Walls: Type 1 installed as required to achieve an R-value of 13.
- B. Thermal and Ignition Barriers: When required to comply with Quality Assurance article, apply overcoat in accordance with approved product manufacturer's instructions.

3.05 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. 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 07 21 19

SECTION 07 27 26
FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes fluid-applied, vapor-permeable membrane air barriers.
- B. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for exterior wall sheathings.

1.02 DEFINITIONS

- A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project Site.
 - 1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.
- B. Shop Drawings: For air-barrier assemblies.
 - 1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 2. Include details of interfaces with other materials that form part of air barrier.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.

- B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.
- C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
 - 1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

1.08 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.
 - 1. Protect substrates from environmental conditions that affect air-barrier performance.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.02 PERFORMANCE REQUIREMENTS

- A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 283, ASTM E 783 or ASTM E 2357.

2.03 VAPOR-RETARDING MEMBRANE AIR BARRIER

- A. Fluid-Applied, Vapor-Retarding Membrane Air Barrier: synthetic polymer membrane.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, subject to the requirements provide Prosoco; R-Guard VB or a comparable product by one of the following:
 - a. Synthetic Polymer Membrane:
 - 1) Grace, W. R., & Co. - Conn.; Perm-A-Barrier Liquid.
 - 2) Henry Company; Air-Bloc 32.
 - 3) BASF Corporation Construction Systems.
 - 2. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E 2178.
 - b. Vapor Permeance: Maximum 0.1 perm (5.8 ng/Pa x s x sq. m); ASTM E 96/E 96M.
 - c. Ultimate Elongation: Minimum 500 percent; ASTM D 412, Die C.

2.04 ACCESSORY MATERIALS

- A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.
- B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.
- C. Joint Reinforcing Strip: Air-barrier manufacturer's glass-fiber-mesh tape.
- D. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
- E. Adhesive and Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.
- F. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0250 inch (0.64 mm) thick, and Series 300 stainless-steel fasteners.
- G. Adhesive-Coated Transition Strip: Vapor-permeable, 17-mil- (0.43-mm-) thick, self-adhering strip consisting of an adhesive coating over a permeable laminate with a permeance value of 37 perms (2145 ng/Pa x s x sq. m).
- H. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 079200 "Joint Sealants."

- I. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that concrete has cured and aged for minimum time period recommended by air-barrier manufacturer.
 - 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 4. Verify that masonry joints are flush and completely filled with mortar.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.03 JOINT TREATMENT

- A. Wood product sheathing panels: Fill joints in accordance with the fluid air-barrier Manufacturer's recommendations.

1. Apply first layer of fluid air-barrier material at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air-barrier material over joint reinforcing strip.

3.04 TRANSITION STRIP INSTALLATION

- A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply adhesive-coated transition strip or elastomeric flashing sheet so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames with not less than 1 inch (25 mm) of full contact.
 1. Adhesive-Coated Transition Strip: Roll firmly to enhance adhesion.
 2. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches (150 mm) o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.
- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- G. Seal top of through-wall flashings to air barrier with an additional 6-inch- (150-mm-) wide, counterflashing strip.
- H. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.05 FLUID AIR-BARRIER MEMBRANE INSTALLATION

- A. General: Apply fluid air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.
 - 1. Apply primer to substrates at required rate and allow it to dry.
 - 2. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Membrane Air Barriers: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.
 - 1. Vapor-Retarding Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than 40-mil (1.0-mm) dry film thickness, applied in one or more equal coats.
- C. Apply strip and transition strip a minimum of 1 inch (25 mm) onto cured air-barrier material or strip and transition strip over cured air-barrier material overlapping 3 inches (75 mm) onto each surface according to air-barrier manufacturer's written instructions.
- D. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.
- E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.06 FIELD QUALITY CONTROL

- A. Coordinate test and inspection requirements in this article with Owner's testing agency.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Retain option in "Inspections" Paragraph below with list of inspections if required for Contractor's information.
- D. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 - 2. Continuous structural support of air-barrier system has been provided.
 - 3. Site conditions for application temperature and dryness of substrates have been maintained.

4. Maximum exposure time of materials to UV deterioration has not been exceeded.
 5. Surfaces have been primed, if applicable.
 6. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 7. Termination mastic has been applied on cut edges.
 8. Strips and transition strips have been firmly adhered to substrate.
 9. Compatible materials have been used.
 10. Transitions at changes in direction and structural support at gaps have been provided.
 11. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 12. All penetrations have been sealed.
- E. Tests: As determined by Owner's testing agency from among the following tests:
1. Quantitative Air-Leakage Testing: Air-barrier assemblies will be tested for air leakage according to ASTM E 783.
 2. Adhesion Testing: Air-barrier assemblies will be tested for minimum air-barrier adhesion of 30 lbf/sq. in. (207 kPa) according to ASTM D 4541 for each 600 sq. ft. (56 sq. m) of installed air barrier or part thereof.
- F. See Section 01 40 00 "Quality Requirements" for retesting and reinspecting requirements and Section 01 73 00 "Execution" for requirements for correcting the Work.
- G. Air barriers will be considered defective if they do not pass tests and inspections.
1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
 2. Remove and replace deficient air-barrier components for retesting as specified above.
- H. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.07 CLEANING AND PROTECTION

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

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 30 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION 07 27 26 07 27 26

SECTION 07 42 13
METAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior wall panels.
- B. Soffit panels.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wall panel substrate.
- B. Section 07 21 00 - Thermal Insulation.
- C. Section 07 27 00 - Air Barriers: Air barrier under wall panels.
- D. Section 07 62 00 - Sheet Metal Flashing and Trim: Transitions between wall panel substrate and wall panels.
- E. Section 07 92 00 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.
- F. Section 09 21 16 - Gypsum Board Assemblies: Wall panel substrate.

1.03 REFERENCE STANDARDS

- A. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2021a.
- B. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2019.

1.04 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures for submittal procedures.
- B. Product Data - Wall System: Manufacturer's data sheets on each product used, including:
 - 1. Physical characteristics of components shown on shop drawings.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions and recommendations.
- C. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, and anchorage methods.

- D. Samples: Submit two samples of wall panel and soffit panel, 12 by 12 inches in size illustrating finish color, sheen, and texture.
- E. Test Reports: Submit test report verifying compliance with NFPA 285 for previously tested exterior wall assembly.
- F. Installer's qualification statement.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installing products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
- C. Prevent contact with materials that may cause discoloration or staining of products.

1.07 WARRANTY

- A. See Section 01 77 00 - Closeout Procedures for additional warranty requirements.
- B. Special Warranty: Provide 20-year warranty covering water tightness and integrity of seals of metal wall panels commencing on Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Metal Soffit Panels:
 - 1. Petersen Aluminum Corporation; Flush and Reveal Metal Soffit Panels: www.pac-clad.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 METAL WALL PANEL SYSTEM

- A. Wall Panel System: Factory-fabricated, prefinished metal panel system, site assembled.
 - 1. Provide soffit panels.
 - 2. Provide components which will support panel dead loads and withstand live loads caused by positive and negative wind pressure acting normally to plane of wall.
 - 3. Design Pressure: In accordance with applicable codes.

4. Fire Performance: Tested in accordance with and complying with acceptance criteria of NFPA 285.
5. Movement: Accommodate movement within system without damage to components or deterioration of seals; between system and perimeter components when subject to seasonal temperature cycling; when subject to dynamic loading and release of loads; and under deflection of structural support framing.
6. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
7. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.

B. Soffit Panels:

1. Profile: Style as indicated, with venting provided.
2. Material: Precoated steel sheet, 22 gauge, 0.0299 inch minimum thickness.
3. Perforation Pattern: As indicated.
4. Color: As indicated.

C. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.

D. Expansion Joints: Same material, thickness, and finish as exterior sheets; ____ gauge, ____ inch thick; manufacturer's standard brake-formed type, of profile to suit system.

E. Trim: J-channels, same material, thickness, and finish as exterior sheets.

F. Anchors: Galvanized steel.

2.03 ACCESSORIES

A. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot-dip galvanized. Fastener cap same color as exterior panel.

B. Field Touch-Up Paint: As recommended by panel manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane, and spaced at intervals indicated.

B. Protection of In-Place Conditions: Protect surrounding areas and adjacent surfaces from damage during execution of this work.

3.02 INSTALLATION

- A. Install panels on walls and soffits in accordance with manufacturer's instructions.

3.03 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.

3.04 PROTECTION

- A. Protect metal wall panels until completion of project.
- B. Touch up, repair, or replace damaged wall panels or accessories before Date of Substantial Completion.

END OF SECTION 07 42 13

SECTION 07 54 23
THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adhered system with thermoplastic polyolefin (TPO) roofing membrane.
- B. Insulation, tapered.
- C. Vapor retarder.
- D. Deck sheathing.
- E. Edge terminations and copings.

1.02 RELATED REQUIREMENTS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim: Counterflashings and scuppers.

1.03 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2022.
- D. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2022.
- E. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing; 2021.
- F. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011 (Reapproved 2019).
- G. FM DS 1-28 - Wind Design; 2016.
- H. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components; 2016, with Editorial Revision (2020).
- I. NRCA (RM) - The NRCA Roofing Manual; 2022.
- J. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Review preparation and installation procedures and coordinating and scheduling required with related work.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's written information listed below.
 - 1. Product data indicating membrane materials, flashing materials, insulation, surfacing, and fasteners.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements.
- B. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, and setting plan for tapered insulation.
- C. Samples for Verification: Submit two samples 12 by 12 inches in size illustrating surface finish and color.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.
- F. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- G. Specimen Warranty: For approval.
- H. Warranty:
 - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 2. Submit installer's certification that installation complies with all warranty conditions for the waterproof membrane.
- I. Installer's Qualification Statement.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty (20) years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section:

1. With minimum five (5) years documented experience.
 2. Approved by membrane manufacturer.
- C. Source Limitation: Obtain all components for roofing system from a single manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- B. Protect products in weather protected environment, clear of ground and moisture.
- C. Protect foam insulation from direct exposure to sunlight.

1.08 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather. Refer to manufacturer's written instructions.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above 90 degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- E. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.
- F. Do not allow grease, oil, fats, or other contaminants to come into direct contact with membrane.

1.09 WARRANTY

- A. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
 1. Warranty Term: 20 years.
 2. For repair and replacement include costs of both material and labor in warranty.
 3. Include accidental punctures according to the manufacturer's standard warranty terms.
 4. Include hail damage according to the manufacturer's standard warranty terms.
 5. Exceptions NOT Permitted:
 - a. Damage due to roof traffic.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Carlisle SynTec Systems: www.carlislesyntec.com/#sle.
- B. Subject to compliance with these requirements, equivalent products from one of the following:
 - 1. Firestone Building Product
 - 2. GAF
 - 3. Johns Manville, a Berkshire Hathaway Company: www.jm.com.

2.02 ROOFING APPLICATIONS

- A. TPO Membrane Roofing: One ply membrane, fully adhered, over insulation.
- B. Roofing Assembly Performance Requirements and Design Criteria:
 - 1. Solar Reflectance Index (SRI): Minimum of 64 based on three-year aged value; if three-year aged data is not available, minimum of 82 initial value.
 - a. Calculate SRI in accordance with ASTM E1980.
 - b. Field applied coating may not be used to achieve specified SRI.
 - 2. Roof Covering External Fire Resistance Classification: Class A when tested per UL 790.
 - 3. Wind Uplift:
 - a. Designed to withstand wind uplift forces calculated with ASCE 7.
 - b. Design Wind Speed: In accordance with local building code and authorities having jurisdiction (AHJ).
 - 4. Factory Mutual Classification: Class 1 and windstorm resistance of 1-90, in accordance with FM DS 1-28.
 - 5. Drainage: No standing water within 48 hours after precipitation.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Single Source Responsibility: Provide and install products from single source.
- B. Membrane:
 - 1. Material: Thermoplastic Polyolefin (TPO) complying with ASTM D6878/D6878M.
 - 2. Reinforcing: Internal fabric.
 - 3. Thickness: 60 mil (0.060 inch), minimum.

4. Sheet Width: Factory fabricated into largest sheets possible.
5. Color: White.
- C. Seaming Materials: As recommended by membrane manufacturer.
- D. Flexible Flashing Material: Same material as membrane.
- E. Base Flashing: Provide waterproof, fully adhered base flashing system at all penetrations, plane transitions, and terminations.

2.04 DECK SHEATHING AND COVER BOARDS

- A. Application: Where indicated on the drawings.
- B. Deck Sheathing: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 5/8 inch thick.
- C. Cover Board: Polyisocyanurate (ISO) thermal board, complying with ASTM C1289; Type II - Faced with dark coated-glass facer on one side and light coated-glass facer on other surface of core foam, Class 4 with thickness of 1/2 inch, and Grade 1 with 109 psi, maximum, compressive strength.

2.05 INSULATION

- A. Polyisocyanurate (ISO) Board Insulation: Complies with ASTM C1289, Type II, Class 1 - Faced with glass-reinforced felt on both surfaces of core foam.
 1. Tapered Board: Slope as indicated; minimum thickness 1 inch; fabricate of fewest layers possible.
 2. Grade and Compressive Strength: Grade 2, 20 psi, minimum.
 3. Board Thickness: 1 inch.

2.06 ACCESSORIES

- A. Prefabricated Flashing Accessories:
 1. Corners and Seams: Same material as membrane, in manufacturer's standard thicknesses.
 2. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
 3. Sealant Pockets: Same material as membrane, with manufacturer's standard accessories, in manufacturer's standard configuration.
 4. Pressure Sensitive Cover Strips: 6 inches wide, 45 mil, 0.045 inch thick, non-reinforced TPO membrane laminated to 35 mil, 0.035 inch thick cured synthetic rubber with pressure sensitive adhesive.

5. Walkway Rolls: Slip-resistant TPO membrane, with diamond plate tread pattern; 80 mil (0.080 inch) thick.
 - a. Width: 34 inches, nominal.
 - b. Length: 50 feet, nominal.
 - c. Tensile Strength: 600 psi, minimum, in accordance with ASTM D638 test method.
 - d. Color: As selected by Architect.
6. Miscellaneous Flashing: Non-reinforced TPO membrane; 80 mil, 0.080 inch thick, in manufacturer's standard lengths and widths.
- B. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.
- C. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
 1. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.
- D. Membrane Adhesive: As recommended by membrane manufacturer.
 1. Product:
- E. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
- F. Sealants: As recommended by membrane manufacturer.
- G. Cleaner: Manufacturer's standard, clear, solvent-based cleaner.
- H. Primer: Manufacturer's recommended product.
- I. Edgings and Terminations: Manufacturer's standard edge and termination accessories.
 1. Coping System: Manufacturer's factory fabricated coping consisting of a base piece and a snap-on cap.
 2. Metal Edge System: Manufacturer's factory fabricated metal edge system used to terminate the roof at the perimeter of the structure.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.

- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 PREPARATION, GENERAL

- A. Clean substrate thoroughly prior to roof application.
- B. Do not begin work until other work that requires foot or equipment traffic on roof is complete.

3.03 METAL DECK PREPARATION

- A. Install deck sheathing on metal deck where indicated on the drawings:
 - 1. Lay with long side at right angle to flutes; stagger end joints; provide support at ends.
 - 2. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface.
 - 3. Tape joints.
 - 4. Mechanically fasten sheathing to roof deck, in accordance with Factory Mutual recommendations and roofing manufacturer's instructions.

3.04 INSTALLATION - GENERAL

- A. Perform work in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Do not apply roofing membrane during unsuitable weather.
- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- F. Coordinate the work with installation of associated counterflashings installed by other sections as the work of this section proceeds.

3.05 INSULATION APPLICATION

- A. Attachment of Insulation:

1. Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions and Factory Mutual requirements.
- B. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.
- C. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.
- D. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.
- E. Lay boards with edges in moderate contact without forcing, and gap between boards no greater than 1/4 inch. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- F. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.
- G. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 18 inches.
- H. Do not apply more insulation than can be completely waterproofed in the same day.

3.06 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Fully Adhered Application: Apply adhesive at manufacturer's recommended rate. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- D. Seam Welding:
 1. Seam Welding: Overlap edges and ends and seal seams by heat welding, minimum 2 inches.
 2. Cover seams with manufacturer's recommended joint covers.
 3. Probe seams once welds have thoroughly cooled, in approximately 30 minutes.
 4. Repair deficient seams within the same day.
 5. Seal cut edges of reinforced membrane after seam probe is complete.
 - a. Cut edge sealant recommended, but not specifically required, for flat surfaces.
 - b. Cut edge sealant not required at vertical splices.

- E. At intersections with vertical surfaces:
 - 1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
 - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
 - 3. Secure flashing to nailing strips at 4 inches on center.
- F. At gravel stops, extend membrane under gravel stop and to the outside face of the wall.
- G. Install roofing expansion joints where indicated. Make joints watertight.
- H. Coordinate installation of roof drains and related flashings. Locate all field splices away from low areas and roof drains. Lap upslope sheet over downslope sheet.
- I. Install walkway pads at areas of concentrated traffic and as shown on Drawings. Space pad joints to permit drainage.
- J. Daily Seal: Install daily seal per manufacturers instructions at the end of each work day. Prevent infiltration of water at incomplete flashings, terminations, and at unfinished membrane edges.

3.07 FIELD QUALITY CONTROL

- A. Require site attendance of roofing material manufacturers as required for warranty during installation of this Work.

3.08 CLEANING

- A. Remove wrappings, empty containers, paper, and other debris from the roof daily. Dispose of debris in compliance with local, State, and Federal regulations.
- B. Remove bituminous markings from finished surfaces.
- C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- D. Repair or replace defaced or damaged finishes caused by work of this section.

3.09 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION 07 54 23

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, and gutters.
- B. PVC downspouts.
- C. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

- A. Section 04 20 00 - Unit Masonry: Metal flashings embedded in masonry.
- B. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.
- C. Section 07 54 23 - TPO Membrane Roofing: Roofing system which includes manufactured copings and edge metal.
- D. Section 07 72 00 - Roof Accessories: Manufactured metal roof curbs and hatches.
- E. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2020, with Errata (2022).
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- C. ASTM B32 - Standard Specification for Solder Metal; 2020.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- E. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a (Reapproved 2021).
- F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- G. CDA A4050 - Copper in Architecture - Handbook; current edition.
- H. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- B. Samples: Submit two samples 6 by 6 inch in size illustrating metal finish color.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sheet Metal Flashing and Trim Manufacturers:
 - 1. ALUCOBOND USA: www.alucobondusa.com/#sle.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SHEET MATERIALS

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch thick base metal, shop pre-coated with PVDF coating.
 - 1. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: Custom to match Sherwin William 7661.

2.03 ACCESSORIES

- A. Downspout:

1. Material: Type: Durable 2-ply polymer material fabricated from recycled materials, 95 percent open design.
 2. ASTM E84 Class A fire rated.
 3. Thickness: Manufacturer's standard
- B. Sealant: Type butyl specified in Section 07 92 00 - Joint Sealants.
- C. Reglets: Recessed or surface mounted type as indicated on the Drawings, galvanized steel.

2.04 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.05 GUTTER AND DOWNSPOUT FABRICATION

- A. Gutters: SMACNA (ASMM) Rectangular profile.
- B. Downspouts: Round profile.
- C. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with SMACNA (ASMM).
- D. Accessories: Profiled to suit gutters and downspouts.
 1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
 2. Gutter Supports: Brackets.
 3. Downspout Supports: Brackets.
- E. Downspout Boots: Steel.
- F. Downspout Extenders: Same material and finish as downspouts.
- G. Seal metal joints.

2.06 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Underlayment: ASTM D2178/D2178M, glass fiber roofing felt.
- C. Primer: Zinc chromate type.
- D. Protective Backing Paint: Zinc molybdate alkyd.
- E. Concealed Sealants: Non-curing butyl sealant.
- F. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- G. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.
- H. Solder: ASTM B32; Sn50 (50/50) type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.03 INSTALLATION

- A. Comply with drawing details.
- B. Insert flashings into reglets to form tight fit; secure in place with plastic wedges; seal flashings into reglets with sealant.
- C. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- D. Apply plastic cement compound between metal flashings and felt flashings.
- E. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

- F. Seal metal joints watertight.
- G. Secure gutters and downspouts in place with concealed fasteners.
- H. Slope gutters 1/4 inch per 10 feet, minimum.
- I. Connect downspouts to downspout boots, and grout connection watertight.

END OF SECTION 07 62 00

SECTION 07 71 00
ROOF SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof control and expansion joint covers.

1.02 RELATED REQUIREMENTS

- A. Section 07 52 16 - Styrene-Butadiene-Styrene Modified Bituminous Roofing (SBS):
Manufactured roof components, including copings, fascias, gravel stops, and roof edge flashings.
- B. Section 07 72 00 - Roof Accessories: Manufactured curbs, roof hatches, and snow guards.
- C. Section 07 92 00 - Joint Sealants.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2020, with Errata (2022).
- B. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- C. NRCA (RM) - The NRCA Roofing Manual; 2022.

1.04 SUBMITTALS

- A. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- B. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
- C. Samples: Submit two appropriately sized samples of control joint cover and expansion joint cover.
- D. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Control and Expansion Joint Covers:

1. Construction Specialties, Inc: www.c-sgroup.com/#sle.
2. EMSEAL Joint Systems, Ltd: www.emseal.com/#sle.
3. Johns Manville: www.jm.com/#sle.

2.02 COMPONENTS

- A. Roof Edge Flashings, Copings, Gravel Stops, and Fascias are specified in Section 07 52 16 - Styrene-Butadiene-Styrene Modified Bituminous Roofing (SBS).
- B. Control and Expansion Joint Covers: Composite construction of 2 inch wide flexible EPDM flashing of white color with closed cell urethane foam backing, each edge seamed to aluminum sheet metal flanges, designed for nominal joint width of 1 inch. Include special formed corners, tees, intersections, and wall flashings, each sealed watertight.

2.03 FINISHES

- A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as selected from manufacturer's standard colors.

2.04 ACCESSORIES

- A. Joint Sealants: Specified in Section 07 92 00 - Joint Sealants.
- B. Sealant for Joints in Linear Components: As recommended by component manufacturer.
- C. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.
- D. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.
 1. See Section 07 72 00 for information on roofing related accessories.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Seal joints within components when required by component manufacturer.
- C. Anchor components securely.

- D. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- E. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

END OF SECTION 07 71 00

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured curbs, equipment rails, and pipe roller supports.
- B. Roof penetrations mounting curbs.
- C. Roof hatches.
- D. Non-penetrating pedestals.

1.02 RELATED REQUIREMENTS

- A. Section 05 50 00 - Metal Fabrications: Access ladders.
- B. Section 07 52 16 - Styrene-Butadiene-Styrene Modified Bituminous Roofing (SBS).
- C. Section 07 92 00 - Joint Sealants.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

1.04 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- B. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
- C. Warranty Documentation:

1. Submit manufacturer warranty.
2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

1.06 WARRANTY

- A. Manufacturer Warranty: Provide 2-year manufacturer warranty for roof hatch. Complete forms in Owner's name and register with manufacturer.
- B. Extended Correction Period: Correct defective work within 5-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.02 ROOF CURBS

- A. Roof Curbs Mounting Assemblies: Factory fabricated hollow sheet metal construction, internally reinforced, and capable of supporting superimposed live and dead loads and designated equipment load with fully mitered and sealed corner joints welded or mechanically fastened, and integral counterflashing with top and edges formed to shed water.
 1. Applications: Roof curbs used for roof penetrations/openings as indicated on drawings.
 2. Roof Curb Mounting Substrate: Curb substrate consists of flat roof deck sheathing with insulation.
 3. Sheet Metal Material:
 - a. Aluminum: 0.080 inch minimum thickness, with 3003 alloy, and H14 temper.
 - 1) Color: As selected by Architect from manufacturer's standard line of colors.
 4. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing system at 1:1 slope; minimum cant height 4 inches.
 5. Provide layouts and configurations indicated on drawings.

- B. Curbs Adjacent to Roof Openings: Provide curb on each side of opening, with top of curb horizontal for equipment mounting.
 - 1. Provide preservative treated wood nailers along top of curb.
 - 2. Insulate inside curbs with 1-1/2 inch thick fiberglass insulation.
 - 3. Height Above Finished Roof Surface: 8 inches, minimum.
- C. Pipe, Duct, or Conduit Mounting Curbs: Vertical posts, minimum 8 inches square unless otherwise indicated.
 - 1. Height Above Finished Roof Surface: 8 inches, minimum.
- D. Pipe Roller Supports: Adjustable roller assembly of top strap, plated vertical rods, cast iron roller chairs, galvanized steel channel shell, base plate and counterflashing.

2.03 ROOF HATCHES AND VENTS

- A. Roof Hatch Manufacturers:
 - 1. Basis of Design: Bilco Company; Type F (equipment access, 4 ft square): www.bilco.com/#sle.
 - 2. Dur-Red Products: www.dur-red.com/#sle.
 - 3. Milcor, Inc: www.milcorinc.com/#sle.
 - 4. Nystrom, Inc: www.nystrom.com/#sle.
- B. Roof Hatches: Factory-assembled aluminum frame and cover, insulated, complete with operating and release hardware.
 - 1. Style: Provide flat metal covers unless otherwise indicated.
 - 2. Mounting Substrate: Provide frames and curbs suitable for mounting on corrugated metal roof deck with insulation.
 - 3. Size: As indicated on drawings; single-leaf style unless otherwise indicated.
- C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
 - 1. Material: Mill finished aluminum, 11 gauge, 0.0907 inch thick.
 - 2. Insulation: Manufacturer's standard; 1 inch rigid glass fiber, located on outside face of curb.
 - 3. Curb Height: 12 inches from surface of roof deck, minimum.
- D. Metal Covers: Flush, insulated, hollow metal construction.

1. Capable of supporting 40 psf external live load and 20 psf internal uplift load.
 2. Material: Mill finished aluminum; outer cover 11 gauge, 0.0907 inch thick, liner 0.04 inch thick.
 3. Insulation: 1 inch rigid glass fiber.
 4. Gasket: EPDM, continuous around cover perimeter.
- E. Hardware: Steel, zinc coated and chromate sealed, unless otherwise indicated or required by manufacturer.
1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
 2. Hinges: Heavy duty pintle type.
 3. Hold open arm with vinyl-coated handle for manual release.
 4. Latch: Upon closing, engage latch automatically and reset manual release.
 5. Manual Release: Pull handle on interior.
 6. Locking: Padlock hasp on interior.

2.04 NON-PENETRATING ROOFTOP SUPPORTS/ASSEMBLIES

- A. Non-Penetrating Rooftop Support/Assemblies: Manufacturer-engineered and factory-fabricated, with pedestal bases that rest on top of roofing membrane, and not requiring any attachment to roof structure and not penetrating roofing assembly.
1. Design Loadings and Configurations: As required by applicable codes.
 2. Height: Provide minimum clearance of 6 inches under supported items to top of roofing.
 3. Support Spacing and Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 4. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 5. Hardware, Bolts, Nuts, and Washers: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A153/A153M.
- B. Pipe Supports: Provide attachment fixtures complying with MSS SP-58 and as indicated.
1. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
 2. See relevant piping system specification section for additional requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.02 CLEANING

- A. Clean installed work to like-new condition.

3.03 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 07 72 00

SECTION 07 76 00
ROOF PEDESTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adjustable pedestal system.

1.02 RELATED SECTIONS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.03 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM D 638 - Tensile Properties of Plastics.
 - 2. ASTM D 790 - Flexural Properties of Unreinforced and Reinforced Plastics Insulating.
 - 3. ASTM D 1525 - Vicat Softening Temperature of Plastics.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Shop Drawings: Showing components required for the paver and pedestal requirements. Include plan drawings showing layout of paver areas and detail drawings showing how components of the system fit together. Include manufacturer's literature describing components of the paver pedestal systems with detailed installation recommendations and instructions. Include detailed installation drawings for pavers.
- C. Structural Analysis: Provide confirmation of (1) the structural capability and adequacy of the structure to carry the dead and live load weight(s) involved, and (2) that the density of any insulation is satisfactory to resist crushing and damaging the waterproofing membrane.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
 - 1. Adjustable Pedestals: Submit sample of each pedestal component.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Installer shall have a minimum of three years experience and be capable of estimating and building from plans and details, determining elevations, and proper material handling. Work shall comply with manufacturer's installation and application procedures for pedestal.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Protect Pedestals during shipment, storage and construction against damage. Store a minimum of 4 inches (102 mm) off the ground in a dry location and cover with polyethylene to protect from contact with materials which would cause staining or discoloration.
- C. Handling: Handle materials to avoid damage.

1.07 PROJECT CONDITIONS

- A. System shall be used with pedestrian traffic only with deck system designed to restrain and contain the decking panels with perimeter blocking or walls. Decking panels shall not be allowed to move laterally.
- B. Decks over Roofing and Waterproofing;
 - 1. Where high density closed cell extruded 60 psi (414 kPa) polystyrene insulation is installed on top of the membrane in a protected membrane system, pedestals may be installed directly on top of the insulation.
 - 2. Do not use pedestals over any insulation less than 60 psi (414 kPa) or with low density polystyrene (bead board) insulation.

1.08 WARRANTY

- A. Manufacturer's Warranty: Pedestal system manufacturer shall warrant the materials to remain free from defects for a period of five years.
 - 1. Pedestal System shall remain free from defects for a period of five years.
- B. Contractor's Warranty: The Contractor shall warrant the Work to remain free from defects of labor and materials used in conjunction with his work in accordance with the General Conditions for this Project for a maximum of two years.

PART 2 PRODUCTS

2.01 PEDESTAL SYSTEM

- A. Basis of Design Pedestal Systems:

1. Uni-Just as manufactured by Tile Tech Inc.
- B. Pedestals:
 1. Uni-Just Pedestals: PVC Pipe and Screw Adjustable:
 - a. Use 4 inch -SDR35 PVC pipe to accommodate various height adjustments from 2-inches to 24 inches (50 mm to 610 mm).
 - b. Self-leveling and can tilt in any direction to a level plane to accommodate slope adjustments from 0% to 4%.
 - c. Base diameter of 7 inches (178 mm) with bearing surface area of thirty eight square inches (.0245 sq. m).
 - d. Made of 100% recycled and flame resistant High Density Polypropylene.
 - e. Use of Buffer Pads under Uni-Just Pedestals is mandatory.
- C. Other Components:
 1. Protection Course:
 - a. Protection board (required over insulated BUR systems, and when specified for use over bituminous asphalt-based waterproofing): W.R. Meadows "Vibraflex" or equal, minimum 3/8 inch (9.5 mm) thick asphaltic composition protection board.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Examination: Prior to starting work inspect the substrate to ensure that it has been properly prepared to accept the Pedestal System. The substrate and or surface shall be clean and free of any projections and debris which may impair the performance of the pedestal and or the deck system. Verify all elevations, required pedestal heights and deck dimensions. Commencement of work shall imply acceptance of surfaces and deck conditions.
- B. Preparation: The substrate surface that will receive the Pedestal System shall be well compacted (on Grade) or structurally capable of carrying the dead and live loads anticipated.
- C. Install in accordance with manufacturer's instructions. Installation requirements vary for each individual project site.
- D. Perimeter Containment: Any area of the pedestal deck that is not restrained by a parapet or foundation wall shall be 'boxed-in' and contained. The deck panels will move if all sides are not adequately restrained. Perimeter framing and edging boards located at the outside of the deck perimeter shall be installed to provide restraint. No movement shall be allowed at the perimeter of the deck system greater than one tab width.

- E. Confirm that deck pedestal height excess of 24 inches (610 mm) have been braced in accordance with Tile Tech Inc written instructions.

3.02 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 76 00

SECTION 07 81 00
APPLIED FIRE PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Applied fire protection of interior structural steel not exposed to damage or moisture.

1.02 RELATED REQUIREMENTS

- A. Section 05 12 00 - Structural Steel Framing.
- B. Section 05 31 00 - Steel Decking.
- C. Section 07 84 00 - Firestopping.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- B. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 2019.
- C. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2019.
- D. ASTM E759/E759M - Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2020).
- E. ASTM E760/E760M - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2020).
- F. ASTM E859/E859M - Standard Test Method for Air Erosion of Sprayed Fire-Resistive Material (SFRMs) Applied to Structural Members; 1993 (Reapproved 2020).
- G. ASTM E937/E937M - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993 (Reapproved 2020).
- H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with placement of ceiling hanger tabs, mechanical component hangers, and electrical components.
- B. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. Product Data: Provide data indicating product characteristics, performance criteria, and limitations of use.
- B. Test Reports: Reports from reputable independent testing agencies for proposed products, indicating compliance with specified criteria, conducted under conditions similar to those on project, as follows:
 - 1. Bond strength.
 - 2. Bond impact.
 - 3. Compressive strength.
 - 4. Fire tests using substrate materials similar those on project.
- C. Field Quality Control Submittals: Submit field test report.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience

1.07 FIELD CONDITIONS

- A. Do not apply fireproofing when temperature of substrate material and surrounding air is below 40 degrees F or when temperature is predicted to be below said temperature for 24 hours after application.
- B. Provide ventilation in areas to receive fireproofing during application and 24 hours afterward, to dry applied material.
- C. Provide temporary enclosure to prevent spray from contaminating air.
- D. Do not allow roof traffic during installation of roof fireproofing and drying period.

1.08 WARRANTY

- A. Correct defective Work within a two year period after Date of Substantial Completion.
 - 1. Include coverage for fireproofing to remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering.
 - 2. Reinstall or repair failures that occur within warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Applied Fire Protection:

1. GCP Applied Technologies: www.gcpat.com/#sle.
2. Isolatek International Corp: www.isolatek.com/#sle.
3. Carboline, Inc.: www.carboline.com.

2.02 APPLIED FIRE PROTECTION ASSEMBLIES

- A. Provide assemblies as indicated on drawings.

2.03 MATERIALS

- A. Applied Fire Protection Material for Interior Applications, Concealed: Manufacturer's standard factory mixed material, which when combined with water is capable of providing indicated fire resistance, and complying with following requirements:
1. Composition: Portland-cement-based, not mineral fiber-based.
 2. Bond Strength: 430 pounds per square foot, minimum, when tested in accordance with ASTM E736/E736M when set and dry.
 3. Dry Density: Minimum average density of 15 lb/cu ft, with minimum individual density of any test sample of 14 lb/cu ft, when tested in accordance with ASTM E605/E605M.
 4. Compressive Strength: 8.33 pounds per square inch, minimum.
 5. Effect of Impact on Bonding: No cracking, spalling or delamination, when tested in accordance with ASTM E760/E760M.
 6. Corrosivity: No evidence of corrosion, when tested in accordance with ASTM E937/E937M.
 7. Air Erosion Resistance: Weight loss of 0.025 g/sq ft, maximum, when tested in accordance with ASTM E859/E859M after 24 hours.
 8. Surface Burning Characteristics: Maximum flame spread index of 0 (zero) and maximum smoke developed index of 0 (zero), when tested in accordance with ASTM E84.
 9. Effect of Deflection: No cracking, spalling, or delamination, when tested in accordance with ASTM E759/E759M.
 10. Fungal Resistance: No growth after 28 days when tested according to ASTM G21.
 11. Basis of Design Product:
 - a. Grace Construction Products; Monokote Z-106/HY: www.gcpat.com.

2.04 ACCESSORIES

- A. Primer Adhesive: Of type recommended by fireproofing manufacturer.

- B. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive fireproofing.
- B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.
- C. Verify that ducts, piping, equipment, or other items that would interfere with application of fireproofing have not been installed.
- D. Verify that voids and cracks in substrate have been filled.
- E. Verify that projections have been removed where fireproofing will be exposed to view as a finish material.

3.02 PREPARATION

- A. Perform tests as recommended by fireproofing manufacturer in applications where adhesion of fireproofing to substrate is in question.
- B. Remove incompatible materials that could effect bond by scraping, brushing, scrubbing, or sandblasting.
- C. Prepare substrates to receive fireproofing in strict accordance with instructions of fireproofing manufacturer.
- D. Apply fireproofing manufacturer's recommended bonding agent on primed steel.
- E. Protect surfaces not scheduled for fireproofing and equipment from damage by overspray, fall-out, and dusting.
- F. Close off and seal duct work in areas where fireproofing is being applied.

3.03 APPLICATION

- A. Apply primer adhesive in accordance with manufacturer's instructions.
- B. Apply fireproofing in uniform thickness and density as necessary to achieve required ratings.
- C. In exposed locations, trowel surface smooth and form square edges, using tools and procedures recommended by fireproofing manufacturer.

3.04 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 40 00 - Quality Requirements.

- B. Inspect installed fireproofing after application and curing for integrity, prior to its concealment.
 - 1. Submit field test reports promptly to Contractor and Architect.
- C. Ensure that actual thicknesses, densities, and bond strengths meet requirements for specified ratings and requirements of authorities having jurisdiction (AHJ).
- D. Repair or replace applied fireproofing at locations where test results indicate fireproofing does not meet specified requirements.
- E. Re-inspect installed fireproofing for integrity of fire protection, after installation of subsequent Work.

3.05 CLEANING

- A. Remove excess material, overspray, droppings, and debris.
- B. Remove fireproofing from materials and surfaces not required to be fireproofed.
- C. At exposed fireproofing, clean surfaces that have become soiled or stained, using manufacturer's recommended procedures.

END OF SECTION 07 81 00

SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

- A. Section 07 81 00 - Applied Fire Protection.
- B. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2020.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).
- C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015 (Reapproved 2019).
- D. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2020.
- E. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013 (Reapproved 2017).
- F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).
- G. ITS (DIR) - Directory of Listed Products; Current Edition.
- H. FM (AG) - FM Approval Guide; current edition.
- I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2017).
- J. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- K. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

- L. UL (DIR) - Online Certifications Directory; Current Edition.
- M. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

- A. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- B. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- D. Installer's qualification statement.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
 - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- B. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Verification of minimum three years experience installing work of this type.

1.06 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
 - 1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
 - 2. Hilti, Inc: www.us.hilti.com/#sle.
 - 3. Nelson FireStop Products: www.nelsonfirestop.com/#sle.

4. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.
- C. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.
- D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
- E. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
 - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
 - 2. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
- B. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
 - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
- C. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
 - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
 - 2. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
- D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
 - 1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.

2. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.04 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION 07 84 00

SECTION 07 92 00
JOINT SEALANTS FOR PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
 - 1. Urethane joint sealants.
 - 2. Preformed joint sealants.
- B. Related Sections:
 - 1. Section 031001 "Cast-in-Place Concrete for Landscape"
 - 2. Section 321313 "Concrete Paving"

1.03 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each kind and color of joint sealant required.
- 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.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- D. Preconstruction compatibility and adhesion test reports.

- E. Preconstruction field-adhesion test reports.
- F. Warranties: Sample of special warranties.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- B. Preinstallation Conference: Conduct conference at Project site.
- C. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.06 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F
 - 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.

1.07 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which 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.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

- B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Colors of Exposed Joint Sealants: As selected by Landscape Architect from manufacturer's full range.

2.02 URETHANE JOINT SEALANTS

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Building Systems.
 - b. Pecora Corporation.
 - c. Sika Corporation.
 - d. Tremco Incorporated.

2.03 SILICONE JOINT SEALANTS

- A. Manufacturers: Subject to compliance with requirements, provide products from one of the following:
 - 1. Dow Corning Corporation.
 - 2. GE Advanced Materials – Silicones.
 - 3. Tremco Incorporated.
- B. Neutral-Curing Silicone Joint Sealant: ASTM C 920.
 - 1. Type: Single Component (S).
 - 2. Grade: Nonsag (NS).
 - 3. Class: 50.
 - 4. Uses Related to Exposure: Nontraffic (NT).

2.04 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2.05 MISCELLANEOUS MATERIALS

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

PART 3 - EXECUTION

3.01 EXAMINATION

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

3.02 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. Concrete.
 - b. Masonry
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. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- 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.

3.03 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

3.04 FIELD QUALITY CONTROL

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

3.05 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.

3.06 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without

deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.07 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - 2. Joint Sealant: Silicone
 - 3. Joint-Sealant Color: As selected by Landscape Architect from manufacturer's full range of colors

END OF SECTION 07 92 00

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 09 30 00 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).
- B. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).
- C. ASTM C834 - Standard Specification for Latex Sealants; 2017.
- D. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2022.
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- F. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- H. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2018.
- I. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.
- J. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).
- K. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2017).
- L. SWRI (VAL) - SWR Institute Validated Products Directory; Current Edition.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
 - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
- B. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- C. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
- D. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
- E. Installation Plan: Submit at least four weeks prior to start of installation.
- F. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
- G. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
- H. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
- I. Installation Log: Submit filled-out log for each length or instance of sealant installed.
- J. Field Quality Control Log: Submit filled-out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.
- K. Executed warranty.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of experience.
- B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- C. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 - 1. Adhesion Testing: In accordance with ASTM C794.
 - 2. Compatibility Testing: In accordance with ASTM C1087.
 - 3. Stain Testing: In accordance with ASTM C1248; required only for masonry substrates.
 - 4. Allow sufficient time for testing to avoid delaying the work.
 - 5. Deliver sufficient samples to manufacturer for testing.
 - 6. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
 - 7. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.
- D. Installation Plan: Include schedule of sealed joints, including the following:
 - 1. Joint width indicated in Contract Documents.
 - 2. Approximate date of installation, for evaluation of thermal movement influence.
 - 3. Installation Log Form: Include the following data fields, with known information filled out.
 - a. Unique identification of each length or instance of sealant installed.
 - b. Location on project.
 - c. Substrates.
 - d. Sealant used.
 - e. Primer to be used, or indicate no primer is used.
 - f. Size and actual backing material used.
 - g. Date of installation.
 - h. Actual joint width; provide space to indicate maximum and minimum width.

- i. Air temperature.
- E. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
1. Identification of testing agency.
 2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
 - a. Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.
 - b. Test date.
 - c. Location on project.
 - d. Sealant used.
 - e. Test method used.
 - f. Date of installation of field sample to be tested.
 - g. Copy of test method documents.
 - h. Test results, modeled after the sample form in the test method document.
- F. Field Quality Control Plan:
1. Visual inspection of entire length of sealant joints.
 2. Nondestructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
 - a. For each different sealant and substrate combination, allow for one test every 12 inches in the first 10 linear feet of joint and one test every 24 inches thereafter.
 - b. If any failures occur in the first 10 linear feet, continue testing at 12 inches intervals at no extra cost to Owner.
 3. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.
 - a. For each different sealant and substrate combination, allow for one test every 100 feet in the first 1,000 linear feet, and one test per 1,000 linear feet thereafter, or once per floor on each elevation.
 - b. If any failures occur in the first 1,000 linear feet, continue testing at frequency of one test per 500 linear feet at no extra cost to Owner.

4. Field testing agency's qualifications.
 5. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- G. Field Adhesion Test Procedures:
1. Allow sealants to fully cure as recommended by manufacturer before testing.
 2. Have a copy of the test method document available during tests.
 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
 4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
 5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
 6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- H. Nondestructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
1. Record results on Field Quality Control Log.
 2. Repair failed portions of joints.
- I. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
1. Sample: At least 18 inches long.
 2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the 1-inch mark is that distance from the substrate, the test has failed.
 3. If either adhesive or cohesive failure occurs before minimum elongation, take necessary measures to correct conditions and retest; record each modification to products or installation procedures.
 4. Record results on Field Quality Control Log.
 5. Repair failed portions of joints.

- J. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or another applicable method as recommended by manufacturer.

1.06 WARRANTY

- A. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Nonsag Sealants:

1. Bostik Inc: www.bostik-us.com/#sle.
2. Dow Chemical Company: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
3. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us/en-us/#sle.
4. Pecora Corporation: www.pecora.com/#sle.
5. Sika Corporation: www.usa-sika.com/#sle.
6. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
7. W.R. Meadows, Inc: www.wrmeadows.com/#sle.

B. Self-Leveling Sealants:

1. Dow Chemical Company: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
2. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us/en-us/#sle.
3. Pecora Corporation: www.pecora.com/#sle.
4. Sika Corporation: www.usa-sika.com/#sle.
5. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
6. W.R. Meadows, Inc: www.wrmeadows.com/#sle.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:

1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Other joints indicated below.
 3. Do not seal the following types of joints:
 - a. Intentional weep holes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover, or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
1. Lap Joints in Sheet Metal Fabrications and between Manufactured Metal Flashing: Butyl rubber, non-curing; where sealant is concealed.
 2. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.
- C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
 2. Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion.

3. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
 4. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.
- D. Interior Wet Areas: Bathrooms; fixtures in wet areas include plumbing fixtures and other similar items.

2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 01 61 16.

2.04 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 2. Color: To be selected by Architect from manufacturer's standard range.
 3. Cure Type: Single-component, neutral moisture curing.
 4. Service Temperature Range: Minus 20 to 180 degrees F.
 5. Products:
 - a. Dow; DOWSIL 790 Silicone Building Sealant: www.dow.com/#sle.
 - b. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com/#sle.
 - c. Sika Corporation; Sikasil WS-290: www.usa.sika.com/#sle.
 - d. Tremco Commercial Sealants & Waterproofing; Spectrem 1: www.tremcosealants.com/#sle.
- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
1. Color: As selected by Architect from Manufacturer's standard range of colors.
 2. Products:
 - a. Pecora Corporation; Pecora 898 NST (Non-Staining Technology): www.pecora.com/#sle.
 - b. Sika Corporation; Sikasil GP: www.usa.sika.com/#sle.

- C. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
 - 1. Color: As selected by Architect from manufacturer's standard range of colors..
 - 2. Grade: ASTM C834; Grade 0 Degrees F (Minus 18 Degrees C).
 - 3. Products:
 - a. Master Builders Solutions: www.master-builders-solutions.com/en-us/#sle.
 - b. Pecora Corporation: www.pecora.com/#sle.
 - c. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
- D. Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, non-sag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.

2.05 SELF-LEVELING JOINT SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
 - 1. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
 - 2. Color: To be selected by Architect from manufacturer's standard range.
 - 3. Products:
 - a. Sherwin-Williams Company; Stampede 1SL Polyurethane Sealant: www.sherwin-williams.com/#sle.
 - b. Sika Corporation; Sikaflex-1c SL: www.usa.sika.com/#sle.
 - c. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
 - 2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.

3. Open Cell: 40 to 50 percent larger in diameter than joint width.
4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Preformed Extruded Silicone Joint Seal: Pre-cured low-modulus silicone extrusion, in sizes to fit applications indicated on drawings, combined with a neutral-curing liquid silicone sealant for bonding joint seal to substrates.
 1. Size: 4 inch wide, in rolls 100 feet long.
 2. Thickness: 0.78 inch, with ridges along outside bottom edges for bonding area.
 3. Color: As selected by Architect..
 4. Products:
 - a. Tremco Commercial Sealants & Waterproofing; Spectrem Simple Seal: www.tremcosealants.com/#sle.
- C. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- D. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- E. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- F. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.
- D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
 2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
 3. Record each test on Preinstallation Adhesion Test Log as indicated.

4. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Architect.
5. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in an inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.
- C. Destructive Adhesion Testing: If there are any failures in first 1,000 linear feet, notify Architect immediately.
- D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.
- E. Repair destructive test location damage immediately after evaluation and recording of results.

END OF SECTION 07 92 00

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire-rated hollow metal doors and frames.
- B. Accessories, including matching panels.

1.02 RELATED REQUIREMENTS

- A. Section 08 71 00 - Door Hardware.
- B. Section 08 80 00 - Glazing: Glass for door lites.
- C. Section 09 91 13 - Exterior Painting: Field painting.
- D. Section 09 91 23 - Interior Painting: Field painting.

1.03 ABBREVIATIONS AND ACRONYMS

- A. ANSI: American National Standards Institute.
- B. HMMA: Hollow Metal Manufacturers Association.
- C. NAAMM: National Association of Architectural Metal Manufacturers.
- D. NFPA: National Fire Protection Association.
- E. SDI: Steel Door Institute.
- F. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2018.
- D. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames; 2020.
- E. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2017.

- F. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.
- G. ANSI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
- H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- I. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021a.
- J. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- K. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.
- L. ASTM C476 - Standard Specification for Grout for Masonry; 2020.
- M. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2016.
- N. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- O. ITS (DIR) - Directory of Listed Products; Current Edition.
- P. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- Q. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- R. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.
- S. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
- T. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
- U. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
- V. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2019.
- W. UL (DIR) - Online Certifications Directory; Current Edition.
- X. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- C. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Structural Performance, Exterior Doors: Exterior hollow metal doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
 - 1. Refer to the Structural Drawings for wind velocity, pressures and other design requirements.

2.02 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 4. Steelcraft, an Allegion brand: www.allegion.com/#sle.

2.03 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:

1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 4. Door Edge Profile: Manufacturers standard for application indicated.
 5. Typical Door Face Sheets: Flush.
 6. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 7. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
 - a. Based on SDI Standards: Provide at least A40/ZF120 (galvanized) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvanized) for corrosive locations.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.04 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Exterior ,Fire-Rated Doors:
1. Basis of Design: Marvin Coastline Entry Door
 - a. Configuration: Single French Door, Swing Right Inswing and Outswing as shown on Drawings.
 - b. Design Pressure: + 55 / -80 psf
 - c. Glazing: See Section 08 80 00
 - d. Door Face Metal Thickness: 20 gauge, 0.032 inch, minimum.
 - e. Finish: Match Sherwin William 7661.
 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").

- a. Temperature-Rise Rating (TRR) Across Door Thickness: In accordance with local building code and authorities having jurisdiction.
 - b. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - c. Attach fire rating label to each fire rated unit.
3. Frame Thickness: As recommended by manufacturer for installation to adjacent brick wall.

2.05 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Door Frames, Fire-Rated: Full profile/continuously welded type.
 1. Fire Rating: Same as door, labeled.
 2. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
 3. Galvanizing at Exterior Type: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
- D. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- E. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
- F. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.
- G. Electrical Knock Out Boxes: Factory weld 18 gage electrical knock out boxes to frame for electrical hardware preps.
 1. Electrical knock out boxes are required at door position switches, electric strikes, card readers and middle hinge locations for all exterior locations regardless of electrical hardware specified in Section 08 71 00.
 2. Provide electrical knock out boxes with 3/4-inch knockouts.
 3. Provide field installed conduit for standardized plug connectors to accommodate up to twelve (12) wires as required for electrified door hardware specified in Section 08 71 00. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Wire nut connections are not acceptable.

2.06 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
 - 1. Fire-Rated Frames: Comply with fire rating requirements indicated.

2.07 ACCESSORIES

- A. Glazing: As specified in Section 08 80 00, factory installed.
 - 1. Glass types are indicated on the drawings.
- B. Astragals for Double Doors: Specified in Section 08 71 00.
 - 1. Fire-Rated Doors: Steel, shape as required to accomplish fire rating.
- C. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
- D. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
- E. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- F. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes and tolerances are acceptable.
- B. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.

- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Install door hardware as specified in Section 08 71 00.
 - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.
- F. Comply with glazing installation requirements of Section 08 80 00.
- G. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION 08 11 13

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; fire-rated.
- B. Factory finishing.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 71 00 - Door Hardware.
- C. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- C. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- D. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
- E. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- F. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- B. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- C. Samples: Submit two samples of door construction, 12 by 12 inches in size cut from top corner of door.
- D. Documentation indicating that composite wood products and fabrication adhesives contain no urea formaldehyde.

- E. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors, pocket doors and veneers from single manufacturer.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

- A. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
 - 1. Graham Wood Doors: www.grahamdoors.com.
 - 2. Ipik Door Company; www.ipikdoors.com.
 - 3. Masonite Architectural: www.architectural.masonite.com/#sle.
 - 4. VT Industries, Inc: www.vtindustries.com/#sle.
 - 5. Oshkosh Architectural Door Company; www.oshkoshdoor.com.
- B. Pocket Doors:
 - 1. Same manufacturer as wood veneer
 - 2. Dimensions and locations as shown on Drawings.

3. Frameless.

2.02 DOORS

- A. Doors: See drawings for locations and additional requirements.
 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 1. Provide solid core doors at each location.
 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
 3. Wood veneer facing with factory opaque finish as indicated on drawings.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies made without binders containing urea formaldehyde and faces as indicated above.
 1. Particleboard Density: 28-32 pcf.
- B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

- A. Veneer Facing for Opaque Finish: Medium density overlay (MDO), in compliance with indicated quality standard.
- B. Facing Adhesive: Type I - waterproof, containing no urea formaldehyde.

2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
 1. Provide solid blocks at lock edge for hardware reinforcement.
 2. Provide solid blocking for other throughbolted hardware.
 3. Provide 5-inch top rail blocking in doors indicated to have closers.

4. Provide 5-inch bottom rail blocking in exterior doors and doors indicated to have kick, mop or armor plates.
- C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. Provide edge clearances in accordance with the quality standard specified.

2.06 FINISHES - WOOD VENEER DOORS

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 1. Opaque:
 - a. System - 11, Polyurethane, Catalyzed.
 - b. Color: As selected by Architect.
 - c. Sheen: Satin.
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

2.07 ACCESSORIES

- A. Hollow Metal Door Frames: See Section 08 11 13.
- B. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for countersink style tamper proof screws.
- C. Door Window Frames in Fire Rated Doors: Door window frames with glazing securely fastened within door opening.
 1. Size: As indicated on drawings.
 2. Frame Material: 18 gauge, 0.0478 inch, galvanized steel.
 3. Metal Finish: Gray polyester powder coating.
 4. Glazing: 1/4 inch thick, tempered glass, unless otherwise indicated, in compliance with requirements of authorities having jurisdiction.

- a. In fire-rated doors provide manufacturer's standard fire-protection-rated glass meeting the performance requirements specified in Section 08 80 00 - Glazing.

D. Door Hardware: See Section 08 71 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes and tolerances are acceptable.
- B. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
 - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

3.05 SCHEDULE - SEE DRAWINGS

END OF SECTION 08 14 16

SECTION 08 14 33
STILE AND RAIL WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wood doors, stile and rail design; non-fire rated.
- B. Panels of wood and glass.

1.02 RELATED REQUIREMENTS

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 14 16 - Flush Wood Doors.
- C. Section 08 71 00 - Door Hardware.
- D. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

1.04 SUBMITTALS

- A. Product Data: Indicate stile and rail core materials and construction; veneer species, type and characteristics.
- B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, and cutouts for glazing.
- C. Samples: Submit two samples of door construction, 12 by 12 inches in size cut from top corner of door.
- D. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver, and store doors in accordance with quality standard specified.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

1.07 WARRANTY

- A. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Stile and Rail Wood Doors:
 - 1. Graham Wood Doors: www.grahamdoors.com.
 - 2. Ipik Door Company; www.ipikdoors.com.
 - 3. Karona, Inc: www.karonadoor.com/#sle.
 - 4. Masonite Architectural: www.architectural.masonite.com/#sle.
 - 5. VT Industries, Inc: www.vtindustries.com/#sle.

2.02 DOORS

- A. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; solid lumber construction; mortise and tenon joints. Opaque finish as indicated on drawings.
- C. Wood veneer facing with factory opaque finish as indicated on drawings.

2.03 DOOR AND PANEL FACINGS

- A. Materials for Opaque Finishes: Medium density overlay (MDO).
- B. Adhesive: Type I - Waterproof.

2.04 DOOR CONSTRUCTION

- A. Panels: Flat.
- B. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- C. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- D. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- E. Factory install glazing in doors in compliance with quality standards specified, using manufacturer's standard elastomeric glazing sealant.

2.05 FINISHES

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Opaque:
 - a. System - 11, Polyurethane, Catalyzed.
 - b. Color: As selected by Architect.
 - c. Sheen: Flat.
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

2.06 ACCESSORIES

- A. Hollow Metal Door Frames: See Section 08 11 13.
- B. Panel or Glass Retention Molding: Wood of same species as door facing, flat bead stop, with butted corners; prepared for countersink style tamper proof screws.
- C. Door Hardware: See Section 08 71 00.
- D. Wood Louvers: Wood, of same species as door facing, flat style.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes and tolerances are acceptable.

- B. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standards.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Adjust width of non-rated doors by cutting equally on both jamb edges.
- D. Trim door height by cutting bottom edges to a maximum of 3/4 inch.
- E. Machine cut for hardware.
- F. Coordinate installation of doors with installation of frames and hardware.
- G. Coordinate installation of glazing.

3.03 TOLERANCES

- A. Comply with specified quality standard for fit, clearance, and joinery tolerances.
- B. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 by 84 inch surface area.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

3.05 SCHEDULE - SEE DRAWINGS

END OF SECTION 08 14 33

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall- and ceiling-mounted access units.

1.02 RELATED REQUIREMENTS

- A. Section 09 21 16 - Gypsum Board Assemblies◇: Openings in partitions and ceilings.
- B. Section 09 91 23 - Interior Painting: Field paint finish.
- C. Division 22 and Division 23: Mechanical components requiring access.
- D. Division 26: Electrical components requiring access.

1.03 SUBMITTALS

- A. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years experience.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. General: The following access panel types are for use as required whether or not indicated on the Drawings, unless indicated elsewhere in Division 22, 23 or 26.
- B. Wall-Mounted Units (Non-public spaces):
 - 1. Location: As indicated on drawings.
 - 2. Panel Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
 - 3. Size: 12 by 12 inches or as required for access to equipment.
 - 4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
 - 5. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
- C. Wall-Mounted Units (in Tiled Areas):

1. Material: Stainless steel, No. 4 brushed finish.
2. Size: 12 by 12 inches or as required for access to equipment.
3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
4. Wall Mounting:
 - a. Schluter REMA Hidden Access Panel System

2.02 WALL- AND CEILING-MOUNTED ACCESS UNITS

A. Manufacturers:

1. Rockfon: www.rockfon.com

B. Wall- and Ceiling-Mounted Units: (For Units and Public Spaces): Factory-fabricated door and frame, coordinate requirements with type of installation assembly being used for each unit.

1. Product: GRG Access Doors.
2. Size: As shown on Drawings.
3. Hardware: As recommended by Manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION 08 31 00

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Weatherstripping.
- D. Perimeter sealant.

1.02 RELATED REQUIREMENTS

- A. Section 07 25 00 - Weather Barriers: Sealing framing to water-resistive barrier installed on adjacent construction.
- B. Section 07 42 13 - Metal Wall Panels.
- C. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
- D. Section 08 42 29 - Automatic Entrances.
- E. Section 08 44 13 - Glazed Aluminum Curtain Walls.
- F. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section including assigned functions.
- G. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
- B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.
- C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2020, with Errata (2022).
- E. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
- J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- L. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2020.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
 - 1. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
- C. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- D. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- E. Samples: Submit two samples 4 x 6 inches in size illustrating finished aluminum surface.
- F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- G. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

- A. Correct defective Work within a five year period after Date of Substantial Completion.
- B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- C. Provide twenty year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN -- FRAMING FOR EXTERIOR, INSULATING GLAZING

- A. Center-Set Style, Thermally-Broken, Wind-Borne-Debris Resistance Tested:
 - 1. Basis of Design: Marvin Coastline.
 - 2. Vertical Mullion Dimensions: 1/12 inches wide by 6-5/8 inches deep.

2.02 BASIS OF DESIGN -- SWINGING DOORS

- A. Insulating, Wind-Borne-Debris Resistance Tested - Exterior:
 - 1. Basis of Design: YKK AP America, Inc.; Model 50HL: www.ykkap.com.
 - 2. Thickness: 1-3/4 inches.

2.03 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
1. Glazing Rabbet: For 1-1/4 inch insulating glazing.
 2. Finish: Superior performing organic coatings.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 - c. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
 3. Finish Color: Custom color to match Sherwin William 7661..
 4. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 5. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 6. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- B. Performance Requirements for Exterior Storefront:
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Design Wind Loads: Comply with requirements of ASCE 7.
 - 1) Design wind pressures are indicated on the drawings.
 - b. Member Deflection: Limit member deflection to 1/180 in any direction, with full recovery of glazing materials.
 2. Wind-Borne-Debris Resistance: Provide identical full-size glazed assembly without auxiliary protection, meeting all requirements of ASTM E1996 Wind Zone 2, Basic Protection.
 3. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 12 lbf/sq ft. minimum.

4. Air Leakage: Maximum of 0.06 cu ft/min/sq ft of wall area and maximum of 1.00 cu ft/min/sq ft for pair of doors, when tested in accordance with ASTM E283 at 6.24 pounds per square foot pressure differential across assembly.
5. Condensation Resistance Factor of Framing: 59, minimum, measured in accordance with AAMA 1503.
6. System Internal Drainage: Drain to the exterior by means of a weep drainage network that includes continuous and wept sill flashing any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
7. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
8. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
9. Overall U-value Including Glazing: 0.45 Btu/(hr sq ft deg F), maximum.

2.04 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 1. Glazing Stops: Flush.
 2. Cross-Section: As indicated on drawings.
 3. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.
 4. Sill Flashing: Extruded aluminum pan with end dams.
 5. Horizontal Joint: Exposed silicone structural glazing (SSG) in locations indicated on the drawings.
- B. Glazing: See Section 08 80 00.
 1. Types are indicated on the drawings.
- C. Swing Doors: Glazed aluminum.
 1. Thickness: 1-3/4 inches.
 2. Top Rail: 5 inches wide.
 3. Vertical Stiles: 5 inches wide.

4. Bottom Rail: 10 inches wide, nominal, complying with ADA requirements.
5. Glazing Stops: Square.
6. Finish: Same as storefront.

2.05 MATERIALS

- A. Recycled Content of Aluminum Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 10 percent.
- B. Extruded Aluminum: ASTM B221.
- C. Sheet Aluminum: ASTM B209.
 1. Painted Finish: 3003-H14 Aluminum Alloy, 0.080 inch thick.
- D. Structural Steel Sections: ASTM A36/A36M; shop primed after fabrication.
- E. Fasteners: Stainless steel.
- F. Exposed Flashings: Aluminum sheet, 20 gauge, 0.032 inch minimum thickness; finish to match framing members.
- G. Concealed Flashings: Sheet aluminum, 26 gauge, 0.017 inch minimum thickness.
- H. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
- I. Sealant for Setting Thresholds: Non-curing butyl type.
- J. Perimeter Sealant: Type Exterior specified in Section 07 92 00 - Joint Sealants.
- K. Glazing Gaskets and Sealants: Type to suit application to achieve weather, moisture, air infiltration, wind load and wind-borne debris resistance requirements.
- L. Glazing Accessories: See Section 08 80 00.

2.06 FINISHES

- A. Superior Performing Organic Coatings System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.
- B. Color: Custom to match Sherwin Williams 7661
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.07 HARDWARE

- A. For each door, include weatherstripping, sill sweep strip, and threshold.

- B. Other Door Hardware: See Section 08 71 00.
- C. Weatherstripping: Wool pile, continuous and replaceable; provide on all exterior doors.
- D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all exterior doors.
- E. Threshold: Extruded aluminum, one piece per door opening, ribbed surface, compatible with exit device; provide on all exterior doors.
- F. Exterior Hinges: Continuous gear type meeting performance requirements.
 - 1. Provide on all exterior doors.
- G. Push/Pull Set: Standard configuration push/pull handles.
 - 1. Provide on all doors.
- H. Exterior Exit Devices: Match those utilized in laboratory testing; function as indicated.
 - 1. Provide on doors as indicated.
- I. Door Closers: Concealed overhead.
 - 1. Provide on doors as indicated.
- J. Handle Latch: Function as indicated.
 - 1. Provide on doors as indicated.
- K. Locks: Dead latch with thumbturn inside ; keyed cylinder outside.
 - 1. Provide on doors as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.

- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings with integral end dams in continuous bed of mastic.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- J. Set thresholds in bed of sealant and secure.
- K. Install hardware using templates provided.
 - 1. See Section 08 71 00 for hardware installation requirements.
- L. Install glass and infill panels in accordance with Section 08 80 00, using exterior standard receptor adapted SSG glazing method.
- M. Install perimeter sealant in accordance with Section 07 92 00 - Joint Sealants.
- N. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL

- A. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
 - 1. Perform a minimum of two tests in each designated area as directed by Architect.
 - 2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
- B. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 ADJUSTING

- A. Adjust operating hardware for smooth operation.

3.06 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.
- C. Remove excess sealant by method acceptable to sealant manufacturer.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 08 43 13

SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum window.

1.02 RELATED REQUIREMENTS

- A. Section 07 25 00 - Weather Barriers: Sealing frame to water-resistive barrier installed on adjacent construction.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between window frames and adjacent construction.
- C. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2017.
- B. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
- C. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.
- D. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- F. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2020, with Errata (2022).
- G. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- H. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- I. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

- J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
- K. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2020.

1.04 SUBMITTALS

- A. Product Data: Include component dimensions and information on glass and glazing.
- B. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, anchorage locations, and installation requirements.
- C. Samples:
 - 1. Framing: Two samples, 12 by 12 inch in size illustrating typical corner construction, accessories, and finishes.
- D. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.
- E. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.
- F. Field Quality Control Submittals: Report of field testing for water penetration.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.07 WARRANTY

- A. Correct defective work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN - MARVIN COASTLINE PICTURE NARROW FRAME WINDOW

- A. Material: Extruded Aluminum

- B. Rating: High velocity hurricane zone (HVHZ) approved
- C. Non-operable window with the glass direct-glazed into the frame.
- D. Sizing: As shown on Drawings
- E. Finish: Custom to match Sherwin Williams 7661

2.02 ALUMINUM WINDOWS

- A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
 - 1. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
 - 2. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 - 3. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
 - 4. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- B. Fixed, Non-Operable Type:
 - 1. Construction: Thermally broken.
 - 2. Glazing: Insulated; clear; low-e as specified in Section 08 80 00 - Glazing.

2.03 PERFORMANCE REQUIREMENTS

- A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
 - 1. Performance Class (PC): AW.
 - 2. Performance Grade (PG): Equivalent to or greater than specified design pressure.
- B. Design Pressure (DP): In accordance with applicable codes.
 - 1. Design wind loads are indicated on the drawings.
- C. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

- D. Wind-Borne-Debris Resistance: Identical full-size glazed assembly without auxiliary protection, tested by independent agency in accordance with ASTM E1996 for Wind Zone 4 - Additional Protection for Large and Small Missile impact and pressure cycling at design wind pressure.
- E. Water Leakage: No uncontrolled leakage on interior face when tested in accordance with ASTM E331 at differential pressure of 12.11 psf.
- F. Air Leakage: 0.1 cfm/sq ft maximum leakage per unit area of outside window frame dimension when tested at 1.57 psf pressure difference in accordance with ASTM E283/E283M.
- G. Condensation Resistance Factor of Frame: 50, measured in accordance with AAMA 1503.
- H. Overall Thermal Transmittance (U-value): 0.35, maximum, including glazing, measured on window sizes required for this project.

2.04 COMPONENTS

- A. Glazing: See Section 08 80 00.
- B. Sills: extruded aluminum; sloped for positive wash; fit under sash leg to 1/2 inch beyond wall face; one piece full width of opening; jamb angles to terminate sill end. Include sill gasket as recommended by manufacturer and shown on Drawings.
- C. Fasteners: Stainless steel.
- D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

2.05 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

2.06 FINISHES

- A. Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.
- B. Finish Color: Custom Color to match Sherwin Williams 7661.
- C. Apply one coat of bituminous coating to concealed aluminum surfaces in contact with dissimilar materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings and adjoining water-resistive barrier materials are ready to receive aluminum windows; see Section 07 25 00.

3.02 PRIME WINDOW INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sill and sill end angles.
- E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.
- G. Install glass in accordance with requirements; see Section 08 80 00.

3.03 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 FIELD QUALITY CONTROL

- A. Provide services of aluminum window manufacturer's field representative to observe for proper installation of system and submit report.
- B. Water-Spray Test: Provide water spray quality test of installed components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
 - 1. Perform a minimum of two tests in each designated area as directed by Architect.
- C. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 CLEANING

- A. Remove protective material from factory finished aluminum surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.
- C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

- D. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION 08 51 13

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors and Frames".
 - 2. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
 - 3. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
 - 4. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure difference.
 - 5. ASTM E1996 - Standard specification for performance of exterior windows, curtain walls, doors and storm shutters impacted by Windborne Debris in Hurricanes.
 - 6. ICC/IBC - International Building Code.
 - 7. NFPA 70 - National Electrical Code.

8. NFPA 80 - Fire Doors and Windows.
 9. NFPA 101 - Life Safety Code.
 10. NFPA 105 - Installation of Smoke Door Assemblies.
 11. TAS-201-94 - Impact Test Procedures.
 12. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
 13. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
 14. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
1. ANSI/BHMA Certified Product Standards - A156 Series.
 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 3. ANSI/UL 294 - Access Control System Units.
 4. UL 305 - Panic Hardware.
 5. ANSI/UL 437- Key Locks.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:

- a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- D. Informational Submittals:
1. Hurricane Resistant Openings: Exterior hurricane opening assemblies to be tested according to ASTM E330, ASTM E1886, ASTM E1996 standards, and certified by a qualified independent third party testing agency acceptable to authority having jurisdiction, with labeling indicating compliance with the wind load and design pressure level requirements specified for the Project.
 2. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.04 QUALITY ASSURANCE

- A. Hardware Supplier and Hardware Installer must obtain a license with the Louisiana Office of State Fire Marshall in accordance to RS 40:1464 and RS 40:1664.

- B. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- C. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- D. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- E. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity.
- F. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
- G. Hurricane Resistant Exterior Openings: Provide exterior door hardware as complete and tested assemblies, or component assemblies, including approved doors and frames specified under Section 081113 "Hollow Metal Doors and Frames", to meet the wind loads, design pressures, debris impact resistance, and glass and glazing requirements applicable to the Project.
 - 1. Test units according to ASTM E330, ASTM E1886, ASTM E1996 standards, certified by a qualified independent third party testing agency acceptable to authority having jurisdiction, and bearing a third party certification agency permanent label indicating windstorm approved product.
- H. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- I. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.

5. Address and requirements for delivery of keys.
- J. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- K. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.06 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.07 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - 1. Seven years for heavy duty cylindrical (bored) locks and latches.
 - 2. Five years for exit hardware.
 - 3. Twenty five years for manual overhead door closer bodies.

1.08 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.02 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
 5. Manufacturers:
 - a. McKinney (MK) - TA Series.

- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:
 - a. Pemko (PE).

2.03 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 2. Furnish dust proof strikes for bottom bolts.
 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 5. Manufacturers:
 - a. Rockwood (RO).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 5. Manufacturers:
 - a. Rockwood (RO).

2.04 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 - 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 - 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 - 4. Tubular deadlocks and other auxiliary locks.
 - 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 - 6. Keyway: Manufacturer's Standard.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
 - 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 - 3. New System: Key locks to a new key system as directed by the Owner.
- E. Key Quantity: Provide the following minimum number of keys:
 - 1. Change Keys per Cylinder: Two (2)
 - 2. Master Keys (per Master Key Level/Group): Five (5).
 - 3. Construction Keys (where required): Ten (10).
 - 4. Construction Control Keys (where required): Two (2).
 - 5. Permanent Control Keys (where required): Two (2).
- F. Construction Keying: Provide construction master keyed cylinders.
- G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.05 KEY CONTROL

- A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).

2.06 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Operational Grade 1 Certified Products Directory (CPD) listed.

1. Locks shall meet or exceed the requirements of ANSI/BHMA A156.2 Series 4000, Grade 1 with all standard trims, as follows:
 - a. Cycle Test: ANSI/BHMA A156.2 Grade 1 requirements with no lever sag.
 - b. Abusive Locked Lever Torque: Exceed 3,100 in-lb with no entry; lock to maintain egress functionality in compliance with BHMA certification requirements.
 - c. Offset Lever Pull: Exceed 1,600 lbs with no entry (8 times ANSI/BHMA A156.2 requirements).
 - d. Latch Retraction with Preload: Exceed 100 lb preload while maintaining ANSI/BHMA requirements for operation in warped doors (2 times ANSI/BHMA A156.2 requirements).
2. Vertical Impact: Exceed 100 vertical impacts (20 times ANSI/BHMA A156.2 requirements).
3. Furnish with solid cast levers, standard 2 3/4" backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
4. Locks are to be non-handed and fully field reversible.
5. Manufacturers:

- a. Sargent Manufacturing (SA) - 10X Line.

2.07 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 3. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
1. Strikes for Mortise Locks and Latches: BHMA A156.13.
 2. Strikes for Bored Locks and Latches: BHMA A156.2.
 3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
 4. Dustproof Strikes: BHMA A156.16.

2.08 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
 6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
 7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
 11. Hurricane and Tornado Resistance Compliance: Conventional exit devices are to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 80 Series.

2.09 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 351 Series.
- C. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.
1. Manufacturers:
 - a. Sargent Manufacturing (SA) - 1431 Series.

2.10 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, .050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
 - a. Rockwood (RO).

2.11 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 - a. Rockwood (RO).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 1. Manufacturers:
 - a. Norton Rixson (RF).
 - b. Rockwood (RO).

- c. Sargent Manufacturing (SA).

2.12 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- E. Manufacturers:
 - 1. Pemko (PE).

2.13 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.14 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

3.03 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.04 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.05 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.06 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. SA - SARGENT
5. RF - Rixson
6. OT - Other

END OF SECTION 08 71 00

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.
- B. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors specified in this Section.
- C. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing provided as part of storefront assembly specified in this Section.
- D. Section 10 28 00 - Toilet, Bath, and Laundry Accessories: Mirrors.

1.03 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
- D. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.
- E. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- F. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.
- G. GANA (GM) - GANA Glazing Manual; 2008.
- H. GANA (SM) - GANA Sealant Manual; 2008.
- I. GANA (LGRM) - Laminated Glazing Reference Manual; 2009.
- J. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (2016).

- K. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2020.
- L. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2020.
- M. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2020.

1.04 SUBMITTALS

- A. Product Data on Insulating Glass Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- C. Samples: Submit two samples 12 by 12 inch in size of glass units.
- D. Samples for Selection: Submit manufacturer's full range of samples of plastic privacy films.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.06 MOCK-UPS

- A. Provide on-site glazing mock-up with the specified glazing components.
- B. Locate where directed.
- C. Mock-ups may remain as part of the Work.

1.07 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

- A. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Glass Fabricators:

- 1. Marvin Coastline: <https://www.marvin.com>
- 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Design Pressure: Calculated in accordance with ASCE 7.
 - a. Design wind pressures are indicated on the drawings.
 - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 4. Glass thicknesses listed are minimum.
- B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
 - 1. In conjunction with weather barrier related materials described in other sections, as follows:
 - a. Air Barriers: See Section 07 27 00.
 - 2. To utilize inner pane of multiple pane insulating glass units for continuity of vapor retarder and/or air barrier seal.
 - 3. To maintain a continuous vapor retarder and/or air barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:

1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 INSULATING GLASS UNITS

A. Manufacturers:

1. Basis of Design: Marvin Coastline

B. Fabricator: Certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.

C. Insulating Glass Units: Types as indicated.

1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
3. Metal-Edge Spacers: Aluminum, bent and soldered corners.
4. Spacer Color: Black.
5. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone or polyurethane sealant as secondary seal applied around perimeter.
6. Color: As scheduled.
7. Purge interpane space with dry air, hermetically sealed.

D. Type IG-1 - Insulating Glass Units: Vision glass, low-e, double glazed, impact resistant.

1. Applications: Exterior glazing unless otherwise indicated.
2. Space between lites filled with air.
3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, nominal.
 - a. Tint: Clear.
 - b. Coating: Low-E (passive type), on #2 surface.

4. Metal edge spacer.
5. Inboard Lite: Annealed float glass, 1/2 inch thick, nominal.
 - a. Two plies of 1/4 inch heat-strengthened float glass.
 - b. Interlayer Thickness: 0.090 inch or as required to meet performance requirements.
 - c. Tint: Clear.
6. Total Thickness: 1-1/4 inch.
7. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.26, maximum.
8. Visible Light Transmittance (VLT): 62 percent, minimum.
9. Solar Heat Gain Coefficient (SHGC): 0.27, maximum.
10. Visible Light Reflectance, Outside: 13 percent, nominal.
11. Ultraviolet Energy Transmittance: zero percent.
12. Glazing Method for Storefront Installations: Pressure glazed as specified in Section 08 43 13 - Aluminum-Framed Storefronts.

2.04 GLAZING UNITS

- A. Type MG-1 - Monolithic Interior Vision Glazing:
 1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch, nominal.
 5. Provide safety glazing labeling.
 6. Glazing Method: Wet glazing method, sealant and sealant.

2.05 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - WET GLAZING METHOD (SEALANT AND SEALANT)

- A. Place setting blocks at 1/4 points and install glazing pane or unit.
- B. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.
- C. Fill gaps between glazing and stops with silicone type sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.

- D. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.05 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.06 PROTECTION

- A. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION 08 80 00

SECTION 08 83 00
MIRRORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass mirrors.
 - 1. Annealed float glass.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Blocking.
- B. Section 09 21 16 - Gypsum Board Assemblies: Substrates.
- C. Section 10 28 00 - Toilet, Bath, and Laundry Accessories: Modular metal framed mirrors.

1.03 REFERENCE STANDARDS

- A. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- B. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2018.
- C. GANA (GM) - GANA Glazing Manual; 2008.
- D. GANA (GM) TD-114 - Guidelines For Fully Tempered Interior Butt-Glazed Fixed Glass Panels; 2023.
- E. GANA (SM) - GANA Sealant Manual; 2008.

1.04 SUBMITTALS GANA (GM) TD-114

- A. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- B. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM) and GANA (SM) for glazing installation methods.
- B. Fabricate, store, transport, receive, install, and clean mirrors in accordance with manufacturer's recommendations.

1.06 WARRANTY

- A. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Mirrors:
 - 1. Vitro Architectural Glass.
 - 2. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MATERIALS

- A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.
- B. Mirror Glass: ASTM C1036, Type 1 - Transparent Flat, Class 1 - Clear, Quality - Q1 (high-quality mirrors); silvering, protective coating, and quality requirements in compliance with ASTM C1503.
 - 1. Thickness: 1/4 inch.
 - 2. Size: As indicated on drawings.

2.03 GLAZING COMPOUNDS

- A. Manufacturer's standard.

2.04 ACCESSORIES

- A. Mirror Attachment Accessories: Stainless steel J-profile channels.
- B. Mirror Adhesive: Silicone pre-polymer based, chemically compatible with mirror coating and wall substrate.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces of mirror frames or recesses are clean, free of obstructions, and ready for installation of mirrors.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.

3.03 INSTALLATION

- A. Install mirrors in accordance with manufacturer's recommendations.
- B. Butt vertical joints as recommended by Manufacturer.
- C. Provide minimum air space of 1/8 inch between back of mirror and substrate.
- D. Set mirrors plumb and level, and free of optical distortion.
- E. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.

3.04 CLEANING

- A. Remove wet glazing materials from finish surfaces.
- B. Remove labels after work is complete.
- C. Clean mirrors and adjacent surfaces.

3.05 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

END OF SECTION 08 83 00

SECTION 08 91 00
LOUVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Louvers, frames, and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 42 13 - Metal Wall Panels: Prepared exterior wall opening.
- B. Section 05 41 00 - Cold-Formed Metal Framing: Supplementary framing for wall opening.
- C. Section 07 25 00 - Weather Barriers: Sealing frames to water-resistive barrier installed on adjacent construction.
- D. Section 07 62 00 - Sheet Metal Flashing and Trim.
- E. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2020, with Errata (2022).
- B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012 (Reapproved 2015).
- C. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices; 2021.
- D. AMCA 540 - Test Method for Louvers Impacted by Wind Borne Debris.
- E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- G. FEMA P-361 - Safe Rooms for Tornadoes and Hurricanes: Guidance for Community and Residential Safe Rooms; 2021.
- H. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters; 2020.

1.04 SUBMITTALS

- A. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.

- B. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, and tolerances; head, jamb and sill details; blade configuration, screens, blank-off areas required, and frames.
- C. Samples: Submit two samples 2 by 2 inches in size illustrating finish and color of exterior surfaces.
- D. Test Reports: Independent agency reports showing compliance with specified performance criteria.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.

1.06 WARRANTY

- A. Provide five year manufacturer's warranty against distortion, metal degradation, and connection failures of louver components.
 - 1. Finish: Include 20 year coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Impact-Resistant Louvers:
 - 1. Basis of Design: Greenheck Fan Corporation: www.greenheck.com
 - 2. Airolite Company, LLC: www.airolite.com/#sle.
 - 3. American Warming and Ventilating: www.awv.com/#sle.
 - 4. Construction Specialties, Inc: www.c-sgroup.com/#sle.

2.02 LOUVERS

- A. Louvers, General: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
 - 1. Wind Load Resistance: Design to resist positive and negative wind load pressures as indicated on the Drawings without damage or permanent deformation.
 - 2. High-Velocity Wind Load Resistance: Design to comply with applicable requirements of ICC 500 and FEMA P-361, including resistance to horizontal debris impact.
 - 3. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft water penetration at calculated intake design velocity based on design air flow and actual free area, when tested in accordance with AMCA 500-L.

4. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
5. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.
- B. Stationary Louvers: Vertical blade, extruded aluminum construction.
 1. Wind-Borne Debris-Resistance: Identical full-size assembly without auxiliary protection tested by independent agency in accordance with AMCA 540 for Wind Zone 3, Basic Protection, for Large Missile impact and pressure cycling at design wind pressure.
 2. Free Area: 55 percent, minimum.
 3. Blades: V-shaped, sight-proof.
 4. Frame: Manufacturer's standard depth, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
 5. Metal Thickness: Frame minimum 0.075 inch; blades minimum 0.060 inch.
 6. Metal Finish: Superior performing organic coating, finished after fabrication.
 7. Color: Custom, to match approved sample.
 - a. Match finish specified in Section 07 42 13 - Metal Wall Panels.
 8. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
 9. Basis of Design Product: Greenheck Fan Corporation; Model EVH-501D: www.greenheck.com.

2.03 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T5 temper.

2.04 FINISHES

- A. Superior Performing Organic Coatings System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.
- B. Primer: Zinc chromate, alkyd type.
- C. Color: Custom, to match approved sample.
 1. Match finish specified in Section 07 42 13 - Metal Wall Panels.

2.05 ACCESSORIES

- A. Blank-Off Panels: Aluminum face and back sheets, polyisocyanurate foam core, 1-1/2 inch thick, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.
- B. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.
- C. Bird Screen: Interwoven wire mesh of aluminum, 14 gauge, 0.0641 inch diameter wire, 1/2 inch open weave, square design.
- D. Insect Screen: 18 x 16 size aluminum mesh.
- E. Fasteners and Anchors: Stainless steel.
- F. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.
- G. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.
- H. Sealant: Exterior type, as specified in Section 07 92 00 - Joint Sealants.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.
- B. Verify that field measurements are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Install louvers level and plumb.
- C. Set sill members and sill flashing in continuous bead of sealant.
- D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
- E. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- F. Secure louver frames in openings with concealed fasteners.
- G. Install perimeter sealant and backing rod in accordance with Section 07 92 00.
- H. Coordinate with installation of mechanical ductwork.

3.03 CLEANING

- A. Strip protective finish coverings.
- B. Clean surfaces and components.

END OF SECTION 08 91 00

SECTION 09 05 61
COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Carpet tile.
 - 3. Thin-set ceramic tile and stone tile.
 - 4. Gloss sealer.
- B. Preparation of new concrete floor slabs for installation of floor coverings.
- C. Testing of concrete floor slabs for moisture and alkalinity (pH).
- D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- E. Patching compound.
- F. Remedial floor coatings.

1.02 RELATED REQUIREMENTS

- A. Section 01 40 00 - Quality Requirements: Additional requirements relating to testing agencies and testing.
- B. Section 03 30 00 - Cast-in-Place Concrete: Limitations on curing requirements for new concrete floor slabs.
- C. Section 03 35 11 - Concrete Floor Finishes.

1.03 REFERENCE STANDARDS

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens); 2021.

- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 2020.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2021.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.
- E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.
- F. ASTM F3010 - Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Covering; 2013.

1.04 SUBMITTALS

- A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used;
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
- B. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
 - 1. Manufacturer's qualification statement.
 - 2. Manufacturer's statement of compatibility with types of flooring applied over remedial product.
 - 3. Manufacturer's installation instructions.
- C. Testing Agency's Report:
 - 1. Description of areas tested; include floor plans and photographs if helpful.
 - 2. Summary of conditions encountered.
 - 3. Moisture and alkalinity (pH) test reports.
 - 4. Copies of specified test methods.
 - 5. Recommendations for remediation of unsatisfactory surfaces.
 - 6. Submit report to Architect.
 - 7. Submit report not more than two business days after conclusion of testing.
- D. Adhesive Bond and Compatibility Test Report.

1.05 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. Contractor may perform adhesive and bond test with Contractor's own personnel or hire a testing agency.
- C. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
 - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- D. Contractor's Responsibility Relating to Independent Agency Testing:
 - 1. Provide access for and cooperate with testing agency.
 - 2. Confirm date of start of testing at least 10 days prior to actual start.
 - 3. Allow at least 4 business days on site for testing agency activities.
 - 4. Achieve and maintain specified ambient conditions.
 - 5. Notify Architect when specified ambient conditions have been achieved and when testing will start.
- E. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 3 years' experience installing moisture emission coatings.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
 - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
 - 2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
 - 3. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Perform following operations in the order indicated:
 - 1. Preliminary cleaning.
 - 2. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
 - 3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
 - 5. Specified remediation, if required.
 - 6. Patching, smoothing, and leveling, as required.
 - 7. Other preparation specified.
 - 8. Adhesive bond and compatibility test.
 - 9. Protection.

B. Remediations:

1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.02 PRELIMINARY CLEANING

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

3.03 MOISTURE VAPOR EMISSION TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.
- F. Report: Report the information required by the test method.

3.04 INTERNAL RELATIVE HUMIDITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.
- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

3.05 ALKALINITY TESTING

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
 - 1. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
 - 2. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
 - 3. Use of a digital pH meter with probe is acceptable; follow meter manufacturer's instructions.
- C. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.06 PREPARATION

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with requirements and recommendations of floor covering manufacturer.
- C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- D. Do not fill expansion joints, isolation joints, or other moving joints.

3.07 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.08 APPLICATION OF REMEDIAL FLOOR COATING

- A. Comply with requirements and recommendations of coating manufacturer.

3.09 PROTECTION

- A. Cover prepared floors with building paper or other durable covering.

END OF SECTION 09 05 61

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Gypsum wallboard including backing board for wet areas.
- E. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 05 40 00 - Cold-Formed Metal Framing: Structural steel stud framing.
- B. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 06 16 43 - GYPSUM SHEATHING.
- D. Section 07 84 00 - Firestopping: Top-of-wall assemblies at fire-resistance-rated walls.
- E. Section 07 92 00 - Joint Sealants: Sealing gaps in construction other than gypsum board or plaster work.
- F. Section 08 31 00 - Access Doors and Panels: Access panels.

1.03 DEFINITIONS

- A. Wet Areas: Wet areas include the following:
 - 1. Walls supporting sinks, toilets and urinals.

1.04 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).
- C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.

- E. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.
- F. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2020.
- G. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.
- H. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.
- I. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2018.
- J. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- K. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2019, with Editorial Revision (2020).
- L. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
- M. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
- N. ASTM E413 - Classification for Rating Sound Insulation; 2022.
- O. GA-216 - Application and Finishing of Gypsum Panel Products; 2021.
- P. UL (FRD) - Fire Resistance Directory; Current Edition.

1.05 SUBMITTALS

- A. Product Data: Provide data on metal framing, glass mat faced gypsum board, accessories, joint finishing system, and each type of board material specified.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five (5) years of experience.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. See PART 3 for finishing requirements.
- B. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
 - 1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
 - 2. Acoustic Attenuation: STC of 55 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Shaft Walls at Elevator Shafts: Provide completed assemblies with the following characteristics:
 - 1. Air Pressure Within Shaft: Intermittent loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
 - 2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- D. Fire-Resistance-Rated Assemblies: Provide completed assemblies with the following characteristics:
 - 1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. ClarkDietrich Building Systems: www.clarkdietrich.com.
 - 2. Jaimes Industries: www.jaimesind.com/#sle.
 - 3. Marino: www.marinoware.com.
 - 4. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
 - 5. SCAFCO Corporation: www.scafco.com/#sle.
 - 6. Telling Industries, LLC; www.buildstrong.com.
- B. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.

1. Minimum Base Metal Thickness: 0.0247 inch (0.626 mm) 25 ga. in all locations unless otherwise required to be 0.0396 inch (1.005 mm) 20 ga. where the following conditions exist:
 - a. Where the floor to floor height (limiting height) exceeds the allowable deflection of 0.0247 inch (0.626 mm) 25 ga. studs.
 - b. At stair shafts, elevator hoistways, and other vertical shafts.
 - c. At partitions to receive stone cladding, ceramic tile, cementitious backer board, abuse-resistant gypsum board, plywood, wood panels, projection screens, marker or chalkboards, veneer plaster, gypsum plaster or interior portland cement plaster.
 - d. At partitions to receive cabinets, countertops, shelving, other wall supported millwork, casework, furniture items, wall-hung plumbing fixtures without chair carriers, countertop support brackets and equipment either furnished and installed by the Contractor, furnished and installed by the Owner or furnished by the Owner and installed by the Contractor.
 - e. At framing for door frames; refer to Part 3, Installing Framed Assemblies.
 - f. At cantilevered furring and miscellaneous framing supports.
 - g. At fire-rated and STC-rated partitions where required by the UL-listing or other testing agency.
 - h. Note: All of the above mentioned materials may not be used on this project.
2. Studs: C-shaped with knurled or embossed faces.
3. Runners: U shaped, sized to match studs.
4. Ceiling Channels: C-shaped.
5. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
- C. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
- D. Partition Head To Structure Connections at Non-Rated Walls: Provide track fastened to structure with legs of sufficient length to accommodate minimum 1 inch deflection, for friction fit of studs cut short .
- E. Partition Head to Structure Connections at Rated Walls: Provide mechanical anchorage devices that accommodate minimum 1 inch deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
1. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot-dipped galvanized coating.

2. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
 3. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-resistance rating of the wall assembly.
- F. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.
1. Products:
 - a. ClarkDietrich; BlazeFrame Firestop Deflection Track: www.clarkdietrich.com/#sle.
 - b. Fire Track Corp.; Shadowline.
 - c. Marino; Deflection Drift Angle.
 - d. Telling Industries; Deflection and Firestopping Track.
- G. Non-structural Framing Accessories:
1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
 2. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
- H. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.

2.03 GYPSUM BOARD, GENERAL

- A. Regional Materials: Gypsum panel products shall be manufactured within 500 miles (800 km) of Project site.
- B. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.04 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 1. American Gypsum Company: www.americangypsum.com/#sle.
 2. CertainTeed Corporation: www.certainteed.com.
 3. Georgia-Pacific Gypsum: www.gpgypsum.com.
 4. National Gypsum Company: www.nationalgypsum.com/#sle.
 5. USG Corporation: www.usg.com.

- B. Gypsum Wallboard: Mold-resistant paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; tapered long edges, ends square cut and meeting the following:
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Glass mat faced gypsum panels, as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold resistant board is required at all locations.
 4. Formaldehyde free.
 5. Type: Fire-resistance rated Type X, UL or WH listed.
 6. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
- C. Backing Board For Wet Areas:
1. Application: Partitions in wet areas including walls supporting sinks, toilets and urinals.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
 - a. Fire-Resistance-Rated Type: Type X core, thickness 5/8 inch.
 - b. Products:
 - 1) CertainTeed Corp.; GlasRoc Tile Backer.
 - 2) Georgia-Pacific Gypsum; DensShield Tile Backer: www.gpgypsum.com/#sle.
 - 3) Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Fire-Shield Tile Backer: www.goldbondbuilding.com/#sle.
 - 4) USG Corporation; USG Sheetrock Brand Glass-Mat Panels Mold Tough.
- D. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
1. Application: Vertical surfaces behind thinset tile, except in wet areas.

2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Type X Thickness: 5/8 inch.
 4. Edges: Tapered.
- E. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings, unless otherwise indicated.
 2. Thickness: 5/8 inch.
 3. Edges: Tapered.
- F. Exterior Sheathing Board: Specified in Section 06 16 43 - GYPSUM SHEATHING.
- G. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
1. Glass Mat Faced Type: Glass mat shaftliner gypsum panel or glass mat coreboard gypsum panel as defined in ASTM C1658/C1658M.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

2.05 GYPSUM BOARD ACCESSORIES

- A. Finishing Accessories: ASTM C1047, extruded aluminum alloy (6063 T5) or galvanized steel sheet ASTM A924/A924M G90, unless noted otherwise.
1. Types: As detailed or required for finished appearance.
 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
 3. Products:
 - a. Same manufacturer as framing materials.
- B. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 2. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners at assemblies containing glass mat faced board.
 3. Joint Compound: Drying type, vinyl-based, ready-mixed.

- C. Screws for Fastening of Gypsum Panel Products to Wood Members and Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.
- D. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.
- E. Isolation Strip at Exterior Walls: Provide one of the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), non-perforated.
 - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 SHAFT WALL INSTALLATION

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
 - 1. Install studs at spacing required to meet performance requirements.
- B. Shaft Wall Liner: Cut panels to accurate dimensions and install sequentially between special friction studs.
 - 1. Seal perimeter of shaft wall and penetrations with acoustical sealant.

3.03 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 - 1. Level ceiling system to a tolerance of 1/1200.
 - 2. Laterally brace entire suspension system.
 - 3. Install bracing as required at exterior locations to resist wind uplift.
- D. Studs: Space studs at 16 inches on center.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.

2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
 3. Partitions Terminating at Structure - Non-Rated: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
 4. Partitions Terminating at Structure - Rated: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- E. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- F. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
1. Orientation: Vertical.
- G. Blocking: Install mechanically fastened steel sheet blocking or wood blocking for support of:
1. Framed openings.
 2. Wall-mounted cabinets.
 3. Plumbing fixtures.
 4. Toilet partitions.
 5. Toilet accessories.
 6. Wall-mounted door hardware.
 7. Grab bars.
 8. Coordinate with Section 06 10 00 - Rough Carpentry.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
1. Install gypsum board 1/2 inch above surface of slab to prevent wicking of moisture unless otherwise indicated.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

1. Exception: Tapered edges to receive joint treatment at right angles to framing.
 2. Exception: Install gypsum board perpendicular to framing at stairwells and walls in excess of 12 feet in height.
- C. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- D. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- E. Installation on Metal Framing: Use screws for attachment of gypsum board.
- F. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board with sealant.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and in accordance with ASTM C 840 in specific locations approved by Architect for visual effect.
1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.06 JOINT TREATMENT

- A. Glass Mat Faced and Water-Resistant Gypsum Board: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
1. Level 4: Walls and ceilings to receive paint finish, unless otherwise indicated.
 2. Level 5: Walls and ceilings to receive wall coverings, unless otherwise indicated.
 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
1. Feather coats of joint compound so that camber is maximum 1/32 inch.

2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
3. Taping, filling, and sanding are not required at base layer of double-layer applications.

3.07 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 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.

3.08 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION 09 21 16

SECTION 09 22 36
LATH

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal lath for cement plaster.
- B. Furring for metal lath.
- C. Metal ceiling framing.

1.02 RELATED REQUIREMENTS

- A. Section 05 40 00 - Cold-Formed Metal Framing: Support framing of exterior walls.
- B. Section 06 16 43 - GYPSUM SHEATHING: Sheathing on exterior walls.
- C. Section 08 31 00 - Access Doors and Panels: Product requirements for metal access panels integral with metal lath.
- D. Section 09 21 16 - Gypsum Board Assemblies.
- E. Section 09 24 00 - Cement Plastering.

1.03 REFERENCE STANDARDS

- A. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring; 2003 (Reapproved 2018).
- B. ASTM C847 - Standard Specification for Metal Lath; 2018.
- C. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.
- D. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2022.
- E. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2022.

1.04 SUBMITTALS

- A. Product Data: Provide data on furring and lathing components, structural characteristics, material limitations, and finish.
- B. Samples:
 - 1. Submit two samples, 2 by 12 inch in size illustrating linear materials and finish.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with at least five years of experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Lath and Accessories:
 - 1. Alabama Metal Industries Corporation: www.amico-lath.com/#sle.
 - 2. CEMCO: www.cemcosteel.com/#sle.
 - 3. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com/#sle.
 - 4. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.

2.02 FRAMING AND LATH ASSEMBLIES

- A. Provide completed assemblies with the following characteristics:
 - 1. Maximum Deflection of Vertical Assemblies: 1:360 under lateral point load of 100 lbs.
 - 2. Maximum Deflection of Horizontal Assemblies: 1:240 deflection under dead loads and wind uplift.

2.03 FRAMING MATERIALS

- A. Furring Channels: Formed steel, minimum 0.020 inch thick, 3/8 inch deep by 7/8 inch high, splicing permitted; galvanized.
- B. Main Ceiling Channels: Formed steel, asphalt coated, minimum 0.05 inch thick, 3/4 inch deep by 1-1/2 inch high, single piece, no splicing; galvanized.
- C. Resilient Channels: Formed steel, minimum 0.020 inch thick; serrated face, flattened Z profile, 1-1/2 inch wide, splicing permitted; galvanized.
- D. Hangers: Steel wire, of size and type to suit application, to support ceiling components in place to deflection limits as indicated.
- E. Ceiling Hangers: Rolled steel sections, of size and type to suit application, to rigidly support ceiling components in place to deflection limits as indicated; galvanized.
- F. Lateral Bracing: Formed steel, minimum 0.060 inch thick, size and length as required; galvanized.

2.04 LATH

- A. Diamond Mesh Metal Lath: ASTM C847, galvanized; self-furring.

1. Weight: To suit application comply with deflection criteria and as specified in ASTM C841 or ASTM C1063 for framing spacing.
2. Backed with treated paper.
- B. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, and maximum possible lengths.
 1. Material: Formed zinc or galvanized sheet steel, expanded metal flanges.
 2. Casing Beads with Weep Holes: Square edges.
 3. Corner Beads: Radiused corners.
 4. Base Screeds: Bevelled edges.
 5. Control Joints: Accordion profile with factory-installed protective tape, 2 inch flanges.

2.05 ACCESSORIES

- A. Access Panels: See Section 08 31 00.
- B. Anchorage: Tie wire, nails, and other metal supports, of type and size to suit application; to rigidly secure materials in place, galvanized.
- C. Fasteners: Self-piercing tapping screws; ASTM C1002 or ASTM C954.
- D. Tie Wire: Annealed galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are ready to receive work and conditions are suitable for application.

3.02 INSTALLATION - GENERAL

- A. Install metal lath and furring for Portland cement plaster in accordance with ASTM C1063.

3.03 WALL FURRING INSTALLATION

- A. Install furring channels horizontally; secure with fasteners on alternate channel flanges at maximum 24 inches on center.
- B. Space furring channels maximum 16 inches on center, and not more than 4 inches away from floor and ceiling lines.
- C. Space resilient channels at maximum 24 inches on center. Place joints over framing members.

3.04 CEILING AND SOFFIT FRAMING INSTALLATION

- A. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- B. Install furring independent of walls, columns, and above-ceiling work.
- C. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.
- D. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.
- E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- F. Install furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.
- G. Reinforce openings in suspension system that interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.
- H. Laterally brace suspension system.

3.05 CONTROL AND EXPANSION JOINT INSTALLATION

- A. Locate joints as indicated on drawings and comply with ASTM C1063.
 - 1. Area of plaster panel not to exceed 144 sq ft for vertical surfaces.
 - 2. Spacing between control joints not to exceed 18 ft in each direction.
 - 3. Area bounded by control joints not to exceed a length-to-width ratio of 2-1/2 to 1.
- B. Install expansion joints where an expansion joint occurs in base exterior wall.
- C. Install prefabricated joint accessories in accordance with ASTM C1063.
- D. Construct expansion joints of back-to-back casing beads with a backer rod and sealant, set 1/4 inch apart.

3.06 LATH INSTALLATION

- A. Apply lath taut, with long dimension perpendicular to supports.
- B. Lap or nest ends of metal lath in accordance with ASTM C841.
- C. Secure end laps with tie wire where they occur between supports.
- D. Attach metal lath to metal supports using tie wire at maximum 6 inches on center.

- E. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches from corner to form the angle reinforcement; fasten at perimeter edges only.
- F. Place corner bead at external wall corners; fasten at outer edges of lath only.
- G. Place base screeds at termination of plaster areas; secure rigidly in place.
- H. Place 4 inch wide strips of lath centered over junctions of dissimilar backing materials, and secure rigidly in place.
- I. Place lath vertically above each top corner and each side of door frames to 6 inches above ceiling line.
- J. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.
- K. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

3.07 TOLERANCES

- A. Maximum Variation from True Lines and Levels: 1/8 inch in 10 feet.

END OF SECTION 09 22 36

SECTION 09 25 13
GYPSUM PLASTERING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Gypsum plastering.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- B. Section 09 21 16 - Gypsum Board Assemblies: Metal stud framing and furring for plaster.
- C. Section 09 22 36 - Lath: Metal lath, furring, and accessories for plaster base.

1.03 REFERENCE STANDARDS

- A. ASTM C842 - Standard Specification for Application of Interior Gypsum Plaster; 2005 (Reapproved 2015).
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
- C. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
- D. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2022.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- F. GA-600 - Fire Resistance and Sound Control Design Manual; 2021.
- G. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. SCAQMD 1113 - Architectural Coatings; 1977, with Amendment (2016).
- I. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

- A. Product Data: Provide data on plaster materials, characteristics, and limitations of products specified.
- B. Samples: Submit two samples, 12 by 12 inch in size illustrating finish color and texture.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience.

1.06 MOCK-UP

- A. Construct mock-up of interior wall, 8 feet long by 8 feet wide, illustrating surface finish.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLIN

- A. Deliver products in original packaging, labeled with product identification, manufacturer, and batch number.
- B. Store products in a dry area with temperature maintained between 50 and 85 degrees F (10 and 29 degrees C). Protect from direct sunlight. Protect from freezing. Protect from extreme heat. (>90 degrees F, 32 degrees C).
- C. Handle products in accordance with manufacturer's printed instructions.

1.08 FIELD CONDITIONS

- A. Do not apply plaster when substrate or ambient air temperature is under 50 degrees F or over 80 degrees F.
- B. Maintain minimum ambient temperature of 50 degrees F during and after installation of plaster.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum Plaster:
 - 1. Basis of Design: Sto Corporation.

2.02 GYPSUM PLASTER ASSEMBLIES

- A. Fire Rated Assemblies: Provide completed assemblies with the following characteristics:
 - 1. ICC IBC Item Numbers: Comply with applicable requirements of ICC (IBC) for the particular assembly.
 - 2. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
 - 3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL Fire Resistance Directory.

2.03 PLASTER MATERIALS

A. Basis of Design: StoQuick Gold

- B. Finishes, primers, adhesives, stains and any other associated materials used with the finish shall be Class A building materials based on testing in accordance with ASTM E84. VOC (Volatile Organic Content) shall be less than 50g/L and shall comply with South Coast AQMD Rule 1113 requirements.

C. Gypsum Soffit or Ceiling Board

1. eXP® glass mat faced gypsum sheathing as manufactured by National Gypsum in compliance with ASTM C1177
2. DensGlass® glass mat faced gypsum sheathing as manufactured by Georgia Pacific in compliance with ASTM C1177.

D. Surface Reinforcement

1. Sto Mesh – nominal 4.5 oz/yd² (153 g/m²) glass fiber reinforcing mesh treated for compatibility with Sto materials
2. Sto BTS Plus – factory blended dry powder high build base coat mixed with potable water

E. Primer

1. StoPrime® – acrylic-based smooth primer for use with Sto Smooth Finishes (Stolit Freeform applied to create a smooth wall finish)

F. Texture: As selected by Architect.

2.04 LATH AND ACCESSORIES

A. Metal Lath and Accessories: As specified in Section 09 22 36.

B. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, maximum possible lengths.

1. Material: Formed aluminum, solid flanges.
2. Casing Beads: Square edges.
3. Corner Beads: Radius corners.
4. Base Screeds: Bevelled edges.
5. Expansion Joints: Accordion profile with factory-installed protective tape, 2 inch wide flanges.
6. Control Joints: Accordion profile with protective tape, 2 inch flanges.

- C. Corner Mesh: Formed sheet steel, minimum 0.018 inch thick, perforated flanges shaped to permit complete embedding in plaster, minimum 2 inch size; galvanized.
- D. Strip Mesh: Expanded metal lath, minimum 0.018 inch thick, 2 inch wide by 24 inch long; galvanized.
- E. Fasteners: Nails, staples, or other approved metal supports, of type and size to suit application, to rigidly secure accessories in place.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing conditions are satisfactory before starting work.
- B. Masonry: Verify joints are cut flush and surface is ready to receive work of this section. Verify no bituminous or water repellent coatings exist on masonry surface.
- C. Concrete: Verify surfaces are flat, honeycomb is filled flush, and surface is ready to receive work of this section. Verify no bituminous, water repellent, or form release agents exist on concrete surface that are detrimental to plaster or plaster bond.
- D. Grounds and Blocking: Verify items within walls for other sections of work have been installed.

3.02 PREPARATION

- A. Dampen masonry surfaces to reduce excessive suction.
- B. Clean concrete surfaces of foreign matter. Thoroughly dampen surfaces before using acid solutions, solvent, or detergents to perform cleaning. Wash surface with clean water.
- C. Roughen smooth concrete surfaces and smooth faced masonry.
- D. Apply bonding agent in accordance with manufacturer's instructions.

3.03 PLASTERING

- A. Apply gypsum plaster in accordance with ASTM C842 and manufacturer's instructions.
- B. Thickness of Plaster including Finish Coat:
 - 1. Direct to unit masonry: 5/8 inch.
 - 2. Finish coat applied direct to concrete: 3/16 inch, maximum.
 - 3. To vertical concrete surfaces: 5/8 inch.
 - 4. To horizontal concrete surfaces: 1/8 to 3/8 inch.

- C. Apply color tinted finish coat to prepared surfaces within four hours of plaster application. Apply in accordance with manufacturer's instructions.
- D. Finish Texture: Trowel to a consistent finish.
- E. Perform work in panels to nearest natural break or between accessories.

END OF SECTION 09 25 13

SECTION 09 30 00
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Ceramic accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 92 00 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
- B. Section 08 31 00 - Access Doors and Panels: Access panels.
- C. Section 09 21 16 - Gypsum Board Assemblies: Tile backer board.
- D. Division 22: Plumbing Fixtures.

1.03 REFERENCE STANDARDS

- A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2017.
- B. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 2017.
- C. ANSI A108.1c - Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2021).
- D. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.
- E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2019.
- F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 2021.
- G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 1999 (Reaffirmed 2019).

- H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2019).
- I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2019).
- J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017.
- K. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.
- L. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2019).
- M. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2021).
- N. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2020.
- O. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2021.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- B. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.
- C. Installer's Qualification Statement:
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Tile: 10 square feet of each size, color, and surface finish combination.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.06 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements for general requirements for mock-up.

- B. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.
 - 1. Minimum size of mock-up is indicated on drawings.
 - 2. Approved mock-up may remain as part of work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 TILE - REFER TO DRAWINGS FOR PRODUCTS

- A. Manufacturers:
 - 1. PORTOBELLO AMERICA
 - 2. DESIGN AND DIRECT SOURCE
 - 3. ROCA TILE
 - 4. LA NOVA TILE
 - 5. BEDROSIANS TILE & STONE
 - 6. FLORIDA TILE
 - 7. TILEBAR

2.02 TRIM AND ACCESSORIES

- A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile; same manufacturer as tile.
- B. Ceramic Trim: Matching bullnose and cove base ceramic shapes in sizes coordinated with field tile.
 - 1. Applications:
 - a. Open Edges: Bullnose.
 - b. Inside Corners: Jointed.

- c. Floor to Wall Joints: Cove base.
- 2. Manufacturers: Same as for tile.
- C. Non-Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
 - 1. Applications:
 - a. Open edges of wall tile, where indicated.
 - b. Wall corners, outside.
 - c. Borders and other trim as indicated on drawings.
 - 2. Manufacturers: Same as for tile.
- D. Thresholds: 2 inches wide by full width of wall or frame opening; beveled edge on both long edges; without holes, cracks, or open seams.
 - 1. Thickness: 1/2 inch.
 - 2. Material: Marble, honed finish.
 - 3. Color and Pattern: As indicated on drawings.
 - 4. Applications:
 - a. At doorways where tile terminates.

2.03 SETTING MATERIALS

- A. Provide setting and grout materials from same manufacturer.

2.04 GROUTS

- A. Provide setting and grout materials from same manufacturer.

2.05 MAINTENANCE MATERIALS

- A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
 - 1. Applications: Between tile and plumbing fixtures.
 - 2. Specified in Section 07 92 00 - Joint Sealants.

2.06 ACCESSORY MATERIALS

- A. Backer Board: Specified in Section 09 21 16 - Gypsum Board Assemblies.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.
- D. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 TILE INSTALLATION - GENERAL

- A. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- B. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align wall joints.
- C. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- D. Install ceramic accessories rigidly in prepared openings.
- E. Install non-ceramic trim in accordance with manufacturer's instructions.
- F. Install thresholds where indicated.
- G. Sound tile after setting. Replace hollow sounding units.
- H. Keep control joints free of adhesive or grout. Apply sealant to joints.
- I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.
- L. Apply mildew-resistant silicone sealant, meeting ASTM C920, to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - WALL TILE

- A. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.

3.05 CLEANING

- A. Clean tile and grout surfaces.

END OF SECTION 09 30 00

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).
- B. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.
- C. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2019.

1.04 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- B. Shop Drawings: Indicate seaming plans and floor patterns.
- C. Verification Samples: Submit two samples, 12 by 12 inch in size illustrating color and pattern for each resilient flooring product specified.
- D. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Flooring Material: 90 square feet of each type and color.
 - 2. Extra Wall Base: 20 linear feet of each type and color.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installing specified flooring with minimum three years experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- D. Protect roll materials from damage by storing on end.
- E. Do not double stack pallets.

1.07 FIELD CONDITIONS

- A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 TILE FLOORING

- A. Stone Polymer Composite Tile - Type RF-1: Luxury vinyl flooring with a core consisting of limestone, polyvinyl chloride, and plasticizers, with transparent or translucent wear layer; acoustic interlayer, or backing.
 - 1. Manufacturers:
 - a. Urban Floor Luxury SPC Vinyl.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.
 - 2. CARB II compliant
 - 3. Tile Size: 7 by 48 inches.
 - 4. Wear Layer Thickness: 0.020 inch.
 - 5. Total Thickness: 0.24 inch nominal.
 - 6. Pattern: As scheduled.
 - 7. Color: As indicated.

- B. Rubber and Cork Tile - Type RF-2: Recycled SBR (styrene butadiene rubber) with colored EPDM (ethylene propylene diene monomer) granules and cork granules; urethane binder.
1. Manufacturers:
 - a. Sustain Cork Rubber.
 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 3. VOC Content Limits: As specified in Section 01 61 16.
 4. Size: 39.4 by 39.4 inch.
 5. Thickness: 0.1 inch minimum.
 6. Pattern: As scheduled.
 7. Color: As indicated.

2.02 RESILIENT BASE

- A. Resilient Base - B-1: ASTM F1861, Type TS rubber, vulcanized thermoset; style as scheduled.
1. Manufacturers:
 - a. Johnsonite, a Tarkett Company; ◇: www.johnsonite.com.
 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
 3. Height: 4 inch, cove.
 4. Thickness: 0.125 inch.
 5. Finish: Matte.
 6. Length: Roll.
 7. Color: As indicated on drawings.
 8. Accessories: Premolded external corners and internal corners.

2.03 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
1. VOC Content Limits: As specified in Section 01 61 16.

- C. Moldings, Transition and Edge Strips: Rubber.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
 - 1. Test in accordance with Section 09 05 61.
 - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
 - 3. Follow moisture and alkalinity remediation procedures in Section 09 05 61.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
 - 1. Spread only enough adhesive to permit installation of materials before initial set.
 - 2. Fit joints and butt seams tightly.
 - 3. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Resilient Strips: Attach to substrate using adhesive.

- F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

3.05 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.07 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION 09 65 00

SECTION 09 72 00
WALL COVERINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Digital wall covering .

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 21 16 - Gypsum Board Assemblies: Substrate.
- C. Section 09 91 23 - Interior Painting: Preparation and priming of substrate surfaces.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.

1.04 SUBMITTALS

- A. Product Data: Provide data on wall covering and adhesive.
- B. Shop Drawings: Indicate wall elevations with seaming layout.
- C. Samples: Submit two samples of wall covering, 12 by 12 inch in size illustrating color, finish, and texture.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.

1.06 MOCK-UPS

- A. Provide panel, six feet wide, full height, illustrating installed wall covering and joint seaming technique.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Inspect roll materials at arrival on site, to verify acceptability.

- B. Protect packaged adhesive from temperature cycling and cold temperatures.
- C. Do not store roll goods on end.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.
- B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers:
 - 1. Arte International: <https://www.arte-international.com/en>
 - 2. Astek: Commercial & Residential Wallcovering: <https://www.astek.com/>

2.02 WALL COVERINGS

- A. General Requirements:
 - 1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.
 - 2. Overcoating: Manufacturer's standard coating for stain resistance.
- B. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
- C. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
- D. Substrate Primer and Sealer: Specified in Section 09 91 23 - Interior Painting.
- E. Products: As scheduled.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.
- B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.

- C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.

3.02 PREPARATION

- A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.
- B. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- C. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.
- B. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.
- C. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.
- D. Do not seam within 2 inches of internal corners or within 6 inches of external corners.
- E. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.
- F. Cover spaces above and below windows, above doors, in pattern sequence from roll.
- G. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.04 CLEANING

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.
- B. Reinstall wall plates and accessories removed prior to work of this section.

3.05 PROTECTION

- A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION 09 72 00

SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Finish exposed surfaces of steel lintels and ledge angles.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
 - 6. Marble, granite, slate, and other natural stones.
 - 7. Floors, unless specifically indicated.
 - 8. Ceramic and other types of tiles.
 - 9. Architectural concrete, cast stone.
 - 10. Glass.
 - 11. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 50 00 - Metal Fabrications: Shop-primed items.

- C. Section 09 03 00 - Conservation Treatment of Period Finishes.
- D. Section 09 24 00 - Cement Plastering.
- E. Section 09 91 23 - Interior Painting.

1.03 REFERENCE STANDARDS

- A. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- C. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- D. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.04 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- B. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.
- C. Manufacturer's Instructions: Indicate special surface preparation procedures.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 - 2. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience.

1.06 MOCK-UPS

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, two feet long by two feet wide, illustrating paint color, texture, and finish for each selection.
- C. Locate where directed by Architect.
- D. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
 - 1. If a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
 - 2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.

3. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.

B. Paints:

1. Base Manufacturer: Benjamin Moore & Company: www.benjaminmoore.com.
2. PPG Paints: www.ppgpaints.com/#sle.
3. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.

1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
4. Supply each paint material in quantity required to complete entire project's work from a single production run.
5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 61 16.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: As indicated on drawings.

1. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.03 PAINT SYSTEMS - EXTERIOR

A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including miscellaneous items.

1. Two top coats and one coat primer.
 2. Top Coat(s): Exterior Latex; MPI #10, 11, 15, 119, or 214.
 3. Top Coat Sheen:
 - a. Satin: MPI gloss level 4; use this sheen at all locations.
 4. Primer: As recommended by top coat manufacturer for specific substrate.
- B. Paint E-OP-MD-DT Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals:
1. Medium duty applications include doors, door frames, railings, handrails, and guardrails.
 2. Two top coats and one coat primer.
 - a. One coat of alkyd primer.
 - b. Semi-gloss: Two coats of alkyd enamel.
 3. Primer: As recommended by top coat manufacturer for specific substrate.
- C. Paint E-OP-FL - Concrete Floors to be Painted.
1. Two top coats and one coat primer.
 2. Top Coat(s): High Build Acrylic Deck and Floor Coating.
 3. Top Coat Sheen:
 - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
 4. Primer: As recommended by top coat manufacturer for specific substrate.
- D. Paint GE-OP-2X -Exterior Plaster and **Masonry**, Opaque, Elastomeric, 2 Coat:
1. One coat of ◇ primer sealer recommended by paint manufacturer.
 2. Flat: One coat of Exterior Pigmented Elastomeric, Water Based; MPI # 40 or # 113.
- E. Paint ME-OP-3A - Ferrous Metals, Unprimed, Alkyd, 3 Coat:
1. One coat of alkyd primer.
 2. Semi-gloss: Two coats of alkyd enamel.
- F. Paint MgE-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
1. One coat galvanize primer.
 2. Semi-gloss: Two coats of alkyd enamel.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 - 1. Alkali Resistant Water Based Primer; MPI #3.
 - 2. Interior/Exterior Latex Block Filler; MPI #4.
 - 3. Anti-Corrosive Alkyd Primer for Metal; MPI #79.
 - 4. Alkyd Primer for Galvanized Metal.
 - 5. Alkyd/Oil Primer for Exterior Wood; MPI #5.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Exterior Plaster and Stucco: 12 percent.
 - 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 - 3. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

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

- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Masonry:
 - 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
 - 2. Prepare surface as recommended by top coat manufacturer.
- G. Exterior Plaster: Fill hairline cracks, small holes, and imperfections with exterior patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- H. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- I. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - 2. Prepare surface according to SSPC-SP 2.
- J. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
 - 3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and hand tools. Protect from corrosion until coated.
- K. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 09 91 13

SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Elevator pit ladders.
 - 3. Finish carpentry items unless shop finished.
 - 4. Prime surfaces to receive wall coverings.
 - 5. Concrete masonry except where indicated to be unfinished.
 - 6. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
 - 6. Floors, unless specifically indicated.
 - 7. Ceramic and other tiles.
 - 8. Existing historic brick exposed to view.

9. Glass.
10. Concrete masonry units where indicated to be unfinished.
11. Interior steel stairs and railings where indicated to be factory-primed and unfinished.
12. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 50 00 - Metal Fabrications: Shop-primed items.
- C. Section 05 51 00 - Metal Stairs: Shop-primed items; exposed to view, unfinished.
- D. Section 09 21 16 - Gypsum Board Assemblies.
- E. Section 09 72 00 - Wall Coverings.
- F. Section 09 91 13 - Exterior Painting.

1.03 REFERENCE STANDARDS

- A. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.
- C. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

1.04 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each:
 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
 2. MPI product number (e.g., MPI #47).
 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- B. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 1. Where sheen is specified, submit samples in only that sheen.

2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 2. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and approved by manufacturer.

1.06 MOCK-UP

- A. Provide panel, two feet long by two feet wide, illustrating paint color, texture, and finish for each selected color.
- B. Locate where directed by Architect.
- C. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.

1. If a single manufacturer cannot provide specified products; minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
3. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.

B. Paints:

1. Base Manufacturer: Sherwin-Williams Company: www.sherwin-williams.com/#sle..
2. Farrow & Ball

C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.

1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
4. Supply each paint material in quantity required to complete entire project's work from a single production run.
5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 61 16.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: As indicated on drawings.

1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.
2. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

2.03 PAINT SYSTEMS - INTERIOR

- A. Types P-1 through P-5: See Finish Schedule for products.
- B. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services in utilitarian spaces, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.
 1. Shop primer by others.
 2. One top coat.
 3. Top Coat: Latex Dry Fall; MPI #118, 155, or 226.
 4. Top Coat Sheen:
 - a. Flat: MPI gloss level 1; use this sheen at all locations.
- C. Paint I-OP-FL - Concrete Interior Floors to be Painted.
 1. Two top coats and one coat primer.
 2. Top Coat(s): Alkyd Floor Enamel, Semi-Gloss; MPI #27.
 3. Top Coat Sheen:
 - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
 4. Primer: As recommended by top coat manufacturer for specific substrate.
- D. Paint MI-OP-3A - Ferrous Metals, Primed and Unprimed, Alkyd, 3 Coat:
 1. One coat of alkyd primer.
 2. Semi-gloss: Two coats of alkyd enamel.
- E. Paint MgI-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
 1. One coat galvanize primer.
 2. Semi-gloss: Two coats of alkyd enamel.
- F. Paint GI-P-1A - Wall Surfaces To Receive Wall Covering, Alkyd Primer, 1 Coat:
 1. One coat of alkyd primer sealer; MPI #136.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 - 1. Alkali Resistant Water Based Primer; MPI #3.
 - 2. Interior/Exterior Latex Block Filler; MPI #4.
 - 3. Concrete Floor Primer, Waterborne.
 - 4. Anti-Corrosive Alkyd Primer for Metal; MPI #79.
 - 5. Alkyd Primer for Galvanized Metal.
 - 6. Stain Blocking Primer; MPI #136.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Plaster and Stucco: 12 percent.
 - 3. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.

- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Masonry:
 - 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
 - 2. Prepare surface as recommended by top coat manufacturer.
- G. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- J. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- K. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
- L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- G. Sand wood and metal surfaces lightly between coats to achieve required finish.
- H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 09 91 23

SECTION 09 96 00
HIGH PERFORMANCE COATINGS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes surface preparation and field application of high-performance coating systems to exterior exposed structural steel, steel sheet and existing pre-finished metal panels.
- B. Related Sections include the following:
 - 1. Division 5 Section "Structural Steel Framing".
 - 2. Division 9 Section "Painting" for items not to receive high-performance coating.

1.02 DEFINITIONS

- A. Standard coating terms defined in ASTM D 16 apply to this Section.
- B. Environments: The following terms are used in Part 2 of this Section to distinguish between different corrosive exposures:
 - 1. "Moderate environments" are corrosive industrial atmospheres with intermittent exposure to high humidity and condensation, occasional mold and mildew development, and regular cleaning with strong chemicals. Environments with exposure to heavy concentrations of chemical fumes and occasional splashing and spilling of chemical products are moderate environments.

1.03 SUBMITTALS

- A. Product Data: For each coating system indicated. Include primers.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.
 - 3. Manufacturer's Certified Test Reports: manufacturer's certified test reports verifying the products meet the performance requirements outlined in paragraph 2.2.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.

- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architect and Owner and other information specified.
- D. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- E. Field-Adhesion-Test Reports: For each sealant application tested.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed high-performance coating system applications similar in material and extent to those indicated for Project and whose work has 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.
- C. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each coating system specified in Part 3.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.05 PRECONSTRUCTION TESTING

- A. Preconstruction Field-Adhesion Testing: Before installing coatings on existing metal panel substrate, field test their adhesion to Project substrates as follows:
 - 1. Locate test substrate where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each kind of coating substrate.

3. Notify Architect seven days in advance of dates and times when test coatings will be applied.
4. Arrange for tests to take place with coating manufacturer's technical representative present.
 - a. Test Method: Test coatings according to ASTM D 4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - b. Minimum Applied Force to Failure: 1030 psi using Test Method E.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:
 1. Name or title of material.
 2. Product description (generic classification or binder type).
 3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. Handling instructions and precautions.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 1. Protect materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and applying coatings.

1.07 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are in accordance with manufacturer's instructions.
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; when surface temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
 - 1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.
 - 2. Work may continue during inclement weather only if areas and surfaces to be coated are enclosed and temperature within the area can be maintained within limits specified by manufacturer during application and drying periods.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Available Products: Products used on this project shall be generically equivalent to those specified in paragraph 2.4 and shall meet the performance requirements outlined in paragraph 2.2.

2.02 PERFORMANCE REQUIREMENTS

- A. Polyurethane Zinc-rich Primer
 - 1. Test Method: ASTM G 85 Prohesion
 - a. Requirement: No blistering, cracking, or delamination of film. No more than 1/64" rust creepage at the scribe after 15,000 hours.
 - 2. Test Method: ASTM B 117 Salt Fog
 - a. Requirement: No blistering, cracking, or delamination of film. No more than 1% rusting on the surface and no more than 1/4" rust creepage at the scribe after 20,000 hours.
- B. Polyamide Epoxy
 - 1. Test Method: ASTM G 85 Prohesion
 - a. Requirement: No blistering, cracking, or delamination of film. No more than 1/8" rust creepage at the scribe after 5,000 hours.
 - 2. Test Method: ASTM B 117 Salt Fog
 - a. Requirement: No blistering, cracking, delamination or rusting on the plane and no rust creepage at the scribe after 10,000 hours (with zinc primer).

2.03 COATINGS MATERIALS, GENERAL

- A. Material Compatibility: Provide primers, undercoats, and finish-coat materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's highest grade of the various high-performance coatings specified. Materials not displaying manufacturer's product identification are not acceptable.

2.04 EXTERIOR HIGH-PERFORMANCE COATING SYSTEMS

- A. Provide the following finish systems over exterior exposed steel:
 - 1. Coating System: Three coats with UV blocker in finish coat.
 - a. First Coat over Non-Galvanized AESS: Polyurethane Zinc-rich Primer Tnemec Series 90G-1K97 Tneme-Zinc applied at 2.5-3.5 dry mils.
 - b. Stripe coat all nuts, bolts and irregular surfaces with polyamide epoxy Tnemec Series 66 HB Epoxoline
 - c. Intermediate Coat: Polyamide epoxy Tnemec Series 66 HB Epoxoline applied at 4.0-6.0 dry mils.
 - d. Top Coat: Thermoset Fluoropolymer Tnemec Series 1070 Fluoronar (Gloss Finish) applied at 2.5-3.0 dry mils.
- B. Where exterior steel is below grade, provide the following finish systems:
 - 1. First Coat over Non-Galvanized AESS: Polyurethane Zinc-rich Primer Tnemec Series 90G-1K97 Tneme-Zinc applied at 2.5-3.5 dry mils.
 - 2. Top Coat: Polyamide Epoxy-Coal Tar Tnemec Series 46H-413 Tneme-Tar applied at 16-20 dry mils.

2.05 COLORS

- A. Colors: To be selected by the Architect or his designated representative from manufacturers standards with Tnemec color charts as a minimum selection.
 - 1. PAINT-3: Color as selected for existing metal panels.
 - 2. PAINT-5: Color as selected for AESS.
 - 3. PAINT-6: Color as selected for AESS.
 - 4. PAINT-7: Color as selected for steel sheet.

5. PAINT-9: Match existing curtain wall at Julia St. for existing storefront indicated to be painted.

- B. There shall be a noticeable contrast in color between the second and third coat.

PART 3 EXECUTION

3.01 EXAMINATION

- A. With Applicator present, examine substrates and conditions under which high-performance coatings will be applied, for compliance with coating application requirements.
 1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
 2. Start of application is construed as Applicator's acceptance of surfaces within that particular area.
- B. Coordination of Work: Review other Sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of specified finish materials to ensure compatible primers.
 1. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding:
 - a. Confirmation of primer's suitability for expected service conditions.
 - b. Confirmation of primer's ability to be top coated with materials specified.

3.02 PREPARATION

- A. General: Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
- B. Cleaning: Before applying high-performance coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.
 1. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for each substrate condition and as specified.
 1. Provide barrier coats over incompatible primers or remove primers and reprime substrate.
 2. Ferrous-Metal Substrates:

- a. SPC-SP6 Commercial Blast Cleaning
 - b. Field Touch-up: Power tool clean all failed areas in accordance with SSPC-SP3. Feather-edge all remaining intact coatings with the failed areas to create a smooth transition. Touch up with same primer as the shop coat.
- D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.
- 1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
 - 2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
 - 3. Use only the type of thinners approved by manufacturer and only within recommended limits.
- E. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

3.03 APPLICATION

- A. General: Apply high-performance coatings according to manufacturer's written instructions.
- 1. Use applicators and techniques best suited for the material being applied.
 - 2. Do not apply high-performance coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
 - 3. Coating colors, surface treatments, and finishes are indicated in the coating system descriptions.
 - 4. Provide finish coats compatible with primers used.
- B. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.
- 1. The number of coats and film thickness required is the same regardless of application method.
 - a. Omit primer on metal surfaces that have been shop primed and touchup painted.
 - b. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.

- c. Where manufacturer's written instructions require sanding, sand between applications to produce a smooth, even surface.
 - d. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat does not cause undercoat to lift or lose adhesion.
- 2. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance. Give special attention to edges, corners, crevices, welds, exposed fasteners, and similar surfaces to ensure that they receive a dry film thickness equivalent to that of flat surfaces.
- C. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
- D. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.04 CLEANING

- A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 - 1. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

3.05 PROTECTION

- A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating and leave in an undamaged condition.
 - 1. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.
 - 2. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION 09 96 00

SECTION 10 14 00
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Room and door signs.

1.02 RELATED REQUIREMENTS

- A. Section 09 21 16 - Gypsum Board Assemblies: Substrate.
- B. Division 26 - Electrical: Exit signs required by code.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- B. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, physical sign location keyed to floor plan, other text to be applied, sign and letter sizes, fonts, and colors.
 - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
 - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
 - 3. Submit for approval by Owner through Architect prior to fabrication.
 - 4. Include floor plan key
- C. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- D. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

- E. Verification Samples: Submit samples showing colors specified.
- F. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

1.07 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Flat Signs:
 - 1. ASI Signage Innovations: www.asisignage.com.
 - 2. Best Sign Systems, Inc: www.bestsigns.com/#sle.
 - 3. Cosco Industries: www.coscoarchitecturalsigns.com/#sle.
 - 4. FASTSIGNS: www.fastsigns.com/#sle.
 - 5. Mohawk Sign Systems, Inc: www.mohawksign.com/#sle.

2.02 SIGNAGE APPLICATIONS

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room Signs: Provide a sign for every room, whether it has a door or not, not including corridors, lobbies, and similar open areas.
 - 1. Sign Type: Flat signs with applied character panel media as specified.

2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
3. Character Height: 1 inch.
4. Sign Height: 6 inches, unless otherwise indicated.
5. Office Doors: Identify with room numbers to be determined later, not the numbers indicated on drawings.
6. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
7. Rest Rooms: Identify with pictograms, the name "RESTROOM", room numbers to be determined later, and braille.
8. Exit Stairs: Comply with regulatory requirements.

2.03 SIGN TYPES

- A. Flat Room Signs: Signage media without frame.
 1. Edges: Square.
 2. Corners: Square.
 3. Clear Cover: For customer produced sign media, provide clear cover of polycarbonate plastic, glossy on back, non-glare on front.
 4. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
 1. Character Font: Helvetica, Arial, or other sans serif font.
 2. Character Case: Upper case only.
 3. Background Color: As scheduled.
 4. Character Color: Contrasting color.

2.04 TACTILE SIGNAGE MEDIA

- A. Applied Character Panels: Acrylic plastic base, with applied acrylic plastic letters and braille.
 1. Total Thickness: 1/8 inch.
 2. Letter Thickness: 1/8 inch.
 3. Letter Edges: Square.

2.05 ACCESSORIES

- A. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION 10 14 00

SECTION 10 28 13
TOILET ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manual soap dispensers.
- B. Paper towel dispensers.
- C. Waste receptacles.
- D. Grab bars.
- E. Coat hooks.
- F. Toilet paper holders.
- G. Toilet paper dispensers.
- H. Fold Down Showre Bench

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate placement of internal wall reinforcement to receive anchor attachments.
- B. Provide templates and rough-in measurements.

1.03 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Samples: Submit two samples of each accessory illustrating color and finish.
- D. Manufacturer's installation instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The Splash Lab; www.thesplashlab.com/usa/#sle.

2.02 TOILET ACCESSORIES

- A. Toilet Roll Holder: Surface mounted.
 - 1. Finish: Brushed Brass PVD - BR.

2. Products:
 - a. The Splash Lab; Radius Single Toilet Roll Holder
#TSL.842: www.thesplashlab.com/usa/#sle.
- B. Pivoting Toiler Paper Holder: Wall Mounted.
 1. Finish: Vibrant Brushed Brass
 2. Product: Koehler Purist Pivoting Toiler Paper Holder K-14377-2MB
- C. Paper Towel Dispenser: Wall mounted.
 1. Finish: Brushed Brass PVD - BR.
 2. Product: The Splash Lab; Wall-Mounted Paper Towel Dispenser
#TSL.735: www.thesplashlab.com/usa/#sle.
- D. Waste Bin: Surface mount.
 1. Slim 4-inch ADA profile.
 2. Flush lock.
 3. Finish: Brushed Brass PVD - BR.
 4. Product: The Splash Lab; Waste Receptacle #TSL.910: www.thesplashlab.com/usa/#sle.
- E. Freestanding Waste Bin
 1. Finish: Black with Aluminum
 2. Product: Koehler, Freestanding Waste Bin
 3. Dimensions: As selected by Architect
- F. Countertop Soap Dispenser:
 1. Finish: Vibrant Brushed Modern Brass
 2. Product: Koehler; Purist Countertop Soap Dispenser; K-14379
- G. Grab Bars:
 1. Length: See drawings.
 2. Finish: Brushed Brass PVD - BR.
 3. Product: The Splash Lab; Radius ADA Grab Bars
#TSL.GR45: www.thesplashlab.com/usa/#sle.
- H. Coat Hook:

1. Finish: Vibrant Brushed Modern Brass
 2. Product: Koehler Purist Robe Hook K-14443-CP
- I. Towel Ring:
1. Finish: Vibrant Brushed Modern Brass
 2. Product: Koehler Purist Towel Ring K-14441-SMB
- J. Fold-Down Shower Bench
1. Product: Moen Commercial DN7110
 2. Material: Wood with Aluminum Frame
 3. Color: As scheduled
 4. Product Dimensions: 16.17"D x 20.47"W x 15.4"H
 5. Hardware: As recommended by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.

3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.03 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION 10 28 13

SECTION 10 28 19
TUB AND SHOWER ENCLOSURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Framed tub and shower doors; enclosures.

1.02 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.
- C. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2021.
- D. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2021, with Errata (2022).
- E. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).
- F. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2017.
- G. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2021.
- H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

1.03 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide manufacturer's literature for enclosure.
- C. Shop Drawings: Indicate layout, dimensions, identification of components, and interface with adjacent construction.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Specimen Warranty.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.
 - 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until installation.

1.06 WARRANTY

- A. See Section 01 77 00 - Closeout Procedures, for additional warranty requirements.
- B. Provide five year manufacturer warranty against structural failure and excessive degradation of metal finishes.

PART 2 PRODUCTS

2.01 TUB AND SHOWER ENCLOSURES - GENERAL

- A. Exposed Fittings and Hardware: Aluminum.
- B. Concealed Fasteners: Manufacturer's standard stainless steel.
- C. Glass Corner Condition: Mitered glass.
- D. Shower Door Height: 79 inches.
- E. Door or Opening Width: 16 inches.
- F. Door Pull: Single-sided; as indicated; mounted through the glass.
- G. Latch: Full length magnetic strips in side channel and strike jamb at swinging and bi-fold doors.
- H. Provide swinging doors with a continuous drip rail and vinyl wiper blade at bottom of panel. Attach drip rail adhesively with transparent double-sided tape with no exposed screws.

2.02 FRAMED TUB AND SHOWER ENCLOSURES

- A. Description: Fixed and operable glass panels individually framed in metal extrusions; enclosure installation may include separate metal sills, jambs and headers.
- B. Configuration: Framed spray panel enclosure with fixed panel and swing panel.

C. Fixed Panel Glass Thickness: 3/16 inch, tempered.

D. Framed Glass Doors:

1. Door Glass Thickness: 1/8 inch, tempered.

2.03 MATERIALS

A. Tempered Glass: Annealed clear flat glass meeting requirements of ASTM C1036, Type I, Quality Q3, fully tempered in accordance with ASTM C1048, Kind FT, and as follows:

1. Cast Glass: Manufacturer's standard cast glass.
2. Thickness: As indicated in enclosure and door types above.
3. Coating: Water and stain resistant.
4. Exposed Edges: Ground and polished smooth with 45 degree chamfers.
5. Prepare glazing panels for indicated fittings and hardware before tempering.

B. Aluminum Components: Complying with ASTM B221 (ASTM B221M), alloy 6063, temper as indicated, with anodized finish complying with AAMA 611, and powder coating complying with AAMA 2603 or AAMA 2604 for select colors.

1. Color: As indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until supports and adjacent substrates are complete.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean substrates thoroughly prior to installation.
- B. Prepare substrates as recommended by the manufacturer.

3.03 INSTALLATION

- A. Fit and align tub and shower enclosure level and plumb.

3.04 ADJUSTING

- A. Adjust tub and shower enclosure doors to operate smoothly.

3.05 CLEANING

- A. Remove protective film and temporary stickers from exposed metal and glass surfaces.
- B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents or other substances that may damage the material or finish.
- C. Glass and Glazing: Clean glazing surfaces; remove excess glazing sealant compounds, dirt, and other substances.
- D. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

3.06 PROTECTION

- A. Protect installed products until Date of Substantial Completion.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 10 28 19

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 09 21 16 - Gypsum Board Assemblies: Roughed-in wall openings.

1.03 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).
- B. FM (AG) - FM Approval Guide; current edition.
- C. NFPA 10 - Standard for Portable Fire Extinguishers; 2022.
- D. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

- A. Product Data: Provide extinguisher operational features.
- B. Shop Drawings: Indicate cabinet physical dimensions and rough-in measurements for recessed cabinets.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

1.06 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release valves.
2. Warranty Period: Six years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:

1. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
2. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.
3. Nystrom, Inc: www.nystrom.com/#sle.
4. Potter-Roemer: www.potterroemer.com/#sle.

B. Fire Extinguisher Cabinets, Fire Extinguishers and Accessories:

1. Basis of Design: Larsen's Manufacturing Co; Architectural Series: www.larsensmfg.com/#sle.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

B. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gauge.

1. Class: K type.
2. Size: 1.6 gallons.
3. Finish: Polished stainless steel.
4. Temperature range: Minus 20 degrees F to 120 degrees F.

2.03 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

B. Fire Rated Cabinet Construction: One-hour fire rated.

- C. Cabinet Configuration: Recessed type unless otherwise indicated.
 - 1. Exterior nominal dimensions: As shown on Drawings.
 - 2. Trimless type.
 - 3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
- D. Door: 1/2 inch thickness, reinforced for flatness and rigidity with roller type catch. Hinge doors for 180 degree opening with continuous piano hinge.
- E. Door Style: Solid, no glazing; recessed handle.
- F. Door Lettering: Vertical decal lettering; black.
- G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- H. Fabrication: Weld, fill, and grind components smooth.
- I. Finish of Cabinet Exterior Trim and Door: Baked enamel, gray color.
- J. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Lettering: "FIRE EXTINGUISHER" decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings, 40 inches from finished floor to operable part of fire extinguisher unless noted otherwise.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets, unless noted otherwise.

END OF SECTION 10 44 00

SECTION 12 05 10
INTERIOR FABRICS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Upholstery Fabrics.

1.02 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures for submittal procedures.
- B. Product Data: Include documentation to confirm compliance with environmental requirements.
.
- C. Samples: Two samples of each fabric, 6 by 6 inches in size, indicating color, pattern, and texture.
- D. Operation and Maintenance Data: Care instructions..

1.03 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. CF Stinson.
- B. Erica Shamrock Textiles.
- C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. No PFAS, fluorocarbons or perfluorinated compounds
- B. No added flame retardants
- C. No added antimicrobials
- D. Passes Fire Testing described in IMO Res.A.652(16) fire test for upholstered IMO-8.

2.03 MATERIALS

- A. FAB-1: CF Stinson Anzea 3251-03 Taurus.
 - 1. Color: As scheduled.

2. Dimensions: As scheduled.

B. Material B: Erica Shamrock Textiles Love Boat.

1. Color: As scheduled.

2. Dimensions: As scheduled.

2.04 ACCESSORIES

A. Fasteners: As recommended by manufacturer..

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's written instructions to the finish carpentry as shown on Drawings.

END OF SECTION 12 05 10

SECTION 12 36 00
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for architectural cabinet work.

1.02 RELATED REQUIREMENTS

- A. Section 06 41 00 - Architectural Wood Casework.

1.03 REFERENCE STANDARDS

- A. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2022.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- E. ISFA 3-01 - Classification and Standards for Quartz Surfacing Material; 2013.
- F. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- G. NSI (DSDM) - Dimensional Stone Design Manual, Version VIII; 2016.

1.04 SUBMITTALS

- A. Shop Drawings: Complete details of materials and installation .
- B. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

1.05 QUALITY ASSURANCE

- A. Fabricator and Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of experience.

1.06 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Natural Quartz and Resin Composite Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
 - 1. Flat Sheet Thickness: 3/4 inch, minimum.
 - 2. Natural Quartz and Resin Composite Sheets, Slabs and Castings: Complying with ISFA 3-01 and NEMA LD 3; orthophthalic polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard stone fabrication tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Manufacturers:
 - 1) Caesarstone {Types SSF-4}: <https://www.caesarstoneus.com/countertops/>
 - 2) Cambria Company LLC; Type SSF-3: www.cambriausa.com/#sle.
 - 3) Corian {Types SSF-1 and SSF-2}: <https://www.corianquartz.com/>
 - b. Products: As scheduled.
 - c. Sizes: As scheduled.
 - d. Factory fabricate components to the greatest extent practical in sizes and shapes indicated; comply with NSI (DSDM).
 - e. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - f. Finish on Exposed Surfaces: Honed.
 - g. Color and Pattern: As indicated on drawings.
 - 3. Other Components Thickness: 3/4 inch, minimum.
 - 4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; square edge.
 - 5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
 - 6. Skirts: As indicated on drawings.
 - 7. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.

2.02 MATERIALS

- A. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
 - 1. VOC: 70 g/L maximum in accordance with SCAQMD Rule 1168, 2005.
- C. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 FABRICATION

- A. Fabricate tops in the largest sections practicable, with top surface of joints flush.
 - 1. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes. Coordinate cutouts with items specified in Section 06 41 00 - Architectural Wood Casework.

2.04 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
- C. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
 - 1. Transparent:
 - a. System - 11, Polyurethane, Catalyzed.
 - b. Stain: Match Architects Sample.
 - c. Sheen: Satin unless otherwise indicated in the drawings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Exposed fasteners not permitted.

3.02 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

3.03 CLEANING

- A. Clean countertops surfaces thoroughly.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 12 36 00

SECTION 14 21 00
LULA ELEVATOR

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Limited Use / Limited Application (LULA) Elevator.

1.02 RELATED SECTIONS

- A. Section 03 30 00 – Cast-in-Place Concrete.
- B. Section 06 10 00 – Rough Carpentry.
- C. Section 07 16 16 - Crystalline Waterproofing
- D. Section 08 10 00 – Doors and Frames.
- E. Section 09 21 16 – Gypsum Board Assemblies.

1.03 REFERENCE STANDARDS

- A. ASME A17.1 - Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices; 2019, with Errata (2021).
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 REFERENCES

- 1. ASME A17.1 / CSA B44 – Safety Code for Elevators and Escalators.
- 2. NFPA 70 – National Electric Code.
- 3. CSA C22.1 – Canadian Electric Code.
- 4. ICC/ANSI A117.1 – Accessible and Usable Buildings and Facilities.
- 5. Local state, province, city, township applicable codes.

1.05 REGULATORY REQUIREMENTS

- A. Obtain approvals from local jurisdiction authority.
- B. Complete work in compliance with national and local codes as listed in 1.03.

1.06 SUBMITTALS

- A. Product Information.

1. Site preparation instructions.
2. Freight receiving, handling, and storage instructions.

B. Shop Drawings.

1. Plan view with finished dimensions.
2. Installation methods.
3. Elevation view with travel distances and anchor locations.
4. Isometric view showing orientation of openings.
5. Machine room details.
6. Electrical requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

1. Store products (unopened) until installation.
2. Store products in covered, dry location.
3. Protect products from theft and vandalism.

1.08 PROJECT CONDITIONS

- A. Elevator may not be used for hoisting materials and personnel during construction period.

1.09 WARRANTY

- A. Provide a 2-Year Warranty on all components and labor.
1. Provide service and maintenance for one year after date of substantial completion.
 2. Provide maintenance contract for paid maintenance beyond 1st year.
 3. Provide 24/7 phone support.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. AmeriGlide Accessibility Solutions: www.ameriglide.com

2.02 LULA ELEVATOR

- A. Product: Ameriglide Lula Style 1L.
- B. Car Siz: 42-inches Wide by 54 inches Deep.

- C. Drive: Fully assembled 2:1 Roped Hydraulic
- D. Capacity: 1,400 pounds
- E. Travel speed: 30 ft./minute
- F. Maximum lift height: 25 feet
- G. Operating power: 208/220 volts
- H. Platform configuration: Enter/exit same side
- I. Safety Features:
 - 1. Emergency Lighting
 - 2. Fire Rated Cab & Doors
 - 3. Emergency Lowering With DC Back-up
 - 4. Self - Leveling
 - 5. Braille Tactile Controls
 - 6. Illuminated Push Buttons
 - 7. Emergency Stop Alarm
 - 8. Hands free ADA phone
 - 9. Stainless Steel Handrail

2.03 FRAME

- A. All steel modular design sling assembly and a welded steel platform

PART 3 EXECUTION

3.01 PREPARATION

- A. Site must be properly prepared prior to starting installation.
- B. Hoistway must be built to correct finished dimensions.
- C. Landing openings must have correct size and centerline location.
- D. Electrical power must be provided to disconnects as directed.
- E. Phone line must be provided.
- F. Controller space must have proper electrical clearances.

- G. Light and GFI outlet provided in machine room.

3.02 ELEVATOR INSTALLATION

- A. Install according to manufacturer's manuals and drawings.
- B. Startup and adjust equipment according to manufacturer's instructions.

3.03 FIELD QUALITY CONTROL

- A. Perform tests/inspections as required by local jurisdiction.
- B. Demonstrate operation in front of Owner and Contractor.

3.04 PROTECTION

- 1. Touch-up, repair, or replace any damaged components prior to completion.

END OF SECTION 14 21 00

SECTION 31 10 00
SITE CLEARING

PART 1 - GENERAL

3.01 SUMMARY

A. This Section includes the following:

1. Protecting existing trees, shrubs, groundcovers, plants, and grass to remain.
2. Removing existing trees, shrubs, groundcovers, plants, and grass.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting and capping or sealing site utilities.
7. Temporary erosion and sedimentation control measures.

3.02 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

3.03 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

C. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.03 TREE PROTECTION

- A. Erect and maintain temporary fencing around tree protection zones before starting site clearing. Remove fence when construction is complete.
- B. Do not excavate within tree protection zones, unless otherwise indicated.
- C. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

3.04 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- C. Removal of underground utilities is included in Division 2 Sections covering site utilities.

3.05 CLEARING AND GRUBBING

- A. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.06 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3.07 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

3.08 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
 - 1. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 31 10 00

SECTION 31 2000
EARTHWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section includes:
 - 1. Site Preparation
 - 2. Excavation
 - 3. Backfill
 - 4. Fill

1.03 DESCRIPTION OF WORK

- A. Extent of earthwork is shown on the drawings.
- B. Contractor shall produce a Storm Water Pollution Prevention Plan (SWPPP) as required by the City of New Orleans.

1.04 QUALITY ASSURANCE

- A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
- B. The Owner will employ an Independent Testing Laboratory to conduct all inspections and testing of fill materials and compaction of fill and backfill.
 - 1. The testing lab shall be in compliance with ASTM E 329 "Standard Specification for Agencies Engaged in Construction Inspection and/or Testing" and ASTM D 3740 "Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction".

1.05 JOB CONDITIONS

- A. Existing Utilities: Locate existing underground utilities, if any, in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
 - 1. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the Utility Owner immediately for directions. Cooperate with Owner

and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

2. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, except when permitted in writing by Architect and then only after acceptable temporary utility services have been provided.
 3. Coordinate with utility companies for shut-off of services if lines are active.
- B. Use of Explosives: The use of explosives is not permitted.
- C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.
- D. Protect structures, utilities, sidewalks, pavements, earthwork activities, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

- A. Fill Material: Select granular material, such as locally available sand, shall be used as backfill and/or fill required to reach design grade. Sand fill shall be non-plastic and free of roots, clay lumps, and other deleterious materials with no more than 10% by weight of material passing a U.S. Standard No. 200 mesh sieve. Prior to transporting this fill to site, a sample shall be tested by the Owner's Independent Testing Laboratory to verify its conformance to these requirements.

2.02 MEMBRANE MATERIALS:

- C. Impermeable geomembrane layer shall be 80 mil HDPE smooth material, in accordance with GRI test method GM13. Acceptable product manufacturers are Layfield Group, U.S. Fabrics Inc., or approved equal. Refer to I.A.G.I. "HDPE and LLDPE geomembrane installation specification", and manufacturer's installation requirements and installation instructions.

2.03 GEOTEXTILE FABRIC

- A. Geotextile Fabric shall be Mirafi 600X or approved equal.

PART 3 - EXECUTION

3.01 SITE PREPARATION

- A. Establish adequate drainage to prevent ponding of water and ensure immediate runoff of all rainfall. Should areas of ponding water develop, the Contractor shall immediately pump ponding water away from areas of construction.
- D. Clearing and Stripping: The existing ground surface shall be stripped of any vegetation, loose topsoil, debris stumps, organic matter, loose fill, and any other deleterious materials. Stripping shall be to the minimum depth necessary to remove any vegetation and roots. Deeper excavations may be required in the vicinity of stumps or demolition debris. The exact depth of stripping shall be determined during construction by a representative of Owner's Independent Testing Laboratory.
- C. Demolition: Provisions shall be made to locate any abandoned underground utilities and foundations which could impact new construction. Existing footings and abandoned pipes shall be removed from site. Voids and dips left by these excavated items shall be proofrolled and backfilled with structural fill material. Existing piles beneath pile supported features shall be cut off at least 2 feet below the pile supported foundations. Existing piles beneath areas of paving features shall be cut off at least 3 feet below the bottom of pavement. Removal of excavated structures shall also conform to Section 202 of the Louisiana Standard Specifications for Roads and Bridges, latest edition.
- D. After stripping and clearing operations, the exposed surface shall be proofrolled with a loaded tandem axle dump truck. The vibratory system on the compactor, if present, shall not be used during proofrolling. Any depressions, stump holes, or weak areas identified shall be thoroughly cleaned out to the surface of firm, undisturbed soil and backfilled with a select structural fill material placed and compacted under controlled conditions. All clearing and compaction operations shall only be performed during periods of dry weather. Proofrolling operations shall be witnessed by a representative of the Owner's Independent Testing Laboratory. Motorized wheeled equipment shall not be allowed within the foundation area during periods of inclement weather.

3.02 EXCAVATION

- A. Shoring and Bracing:
 - 1. Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.
 - 2. Establish requirements for shoring and bracing to comply with local codes and authorities having jurisdiction.
 - 3. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
 - 4. Provide permanent steel sheet piling or pressure treated timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures, paving, etc. Cut off tops are required and leave permanently in place.
- B. Dewatering:

1. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
2. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
3. Convey water removed from excavations and rain water to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
4. Dispose of excess soil material and waste materials as herein specified.

C. Excavation for Structures:

1. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete form work, installation of services other construction, and for inspection.
2. In excavating for footings and other subgrade construction, take care not to disturb bottom of excavation. Trim bottoms to required lines and grades to leave solid base to receive concrete.

D. Excavation for Trenches:

1. Dig trenches to the uniform width required for the particular item to be installed, sufficiently wide to provide ample working room.
2. Excavate trenches to the depth indicated or required. Carry the depth of trenches for piping to establish the indicated flow lines and invert elevations. Beyond the building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.
3. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for the entire body of pipe.
4. Backfill trenches with concrete where trench excavations pass within 18" of soil supported column or wall footings which are carried below the bottom of such footings, or which pass under wall footings. Otherwise compact as required for adjacent soil. Concrete is specified in Division 3.
5. Do not backfill trenches until tests and inspections have been made. Use care in backfilling to avoid damage or displacement of pipe systems.

E. Cold Weather Protection:

1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

3.03 COMPACTION

- A. Structural fill beneath areas of paving shall be placed in maximum lifts of 8 inches and compacted to 95% of its maximum dry density near optimum moisture (-1% to +3%) in accordance with ASTM D 698. Placement of all fill shall be witnessed by a representative of the Owner's Independent Testing Laboratory. Structural fill material shall be certified and approved by the Owner's Independent Testing Laboratory prior to its use.
- B. Select used for grading of pile-supported building foundations shall be spread in loose lifts of 10 to 12 inches and compacted by several passes of a bulldozer.
- C. Moisture Control:
 - 1. Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material.
 - 2. Remove and replace soil material that is too wet to permit compaction to specified density.

3.04 BACKFILL AND FILL

- A. General: Place fill or satisfactory excavated material in layers to required subgrade elevations.
- B. Backfill excavations as promptly as work permits, but not until completion of the following:
 - 1. Acceptance by Architect of construction below finish grade.
 - 2. Inspection, testing approval, and recording locations of underground utilities.
 - 3. Removal of concrete formwork.
 - 4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures or remove in manner to prevent settlement of the structure or utilities, or leave in place if required.
 - 5. Removal of trash and debris.
 - 6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

3.05 FIELD QUALITY CONTROL

- A. Quality Control Testing during Construction: Allow Owner's Independent Testing Laboratory to inspect and approve each subgrade and fill layer before further backfill or construction work is performed. The in-place density and water content shall be determined by the independent testing laboratory by using the ASTM D6938-10 Standard Test Method.

1. Utility Trenches - One compaction test per 100 linear feet of each lift and a minimum of one test between utility structures (catch-basin, manholes, etc.) per lift.
 2. Under areas of paving – For areas under 5,000 S.F., two compaction tests per 2,500 S.F. for each lift is required. For areas that exceed 5,000 S.F., two compaction tests per 5,000 S.F. for each lift is required.
 3. In instances where multiple tests are required, the test locations shall be selected by the Engineer of Record to provide the maximum available distance between the test locations.
- B. Rejection of Compacted Materials: If in opinion of Owner's Independent Testing Laboratory, based on testing service reports and inspection, subgrade or fills that have been placed are below specified density, perform additional compaction and testing until specified density is obtained.

3.06 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal from Owner's Property: Remove trash debris, excess excavated material and waste materials and lawfully dispose of it off the Owner's property at regular intervals. Do not allow materials to accumulate on site in a manner that would hamper dewatering operations.

END OF SECTION 31 2001

SECTION 31 31 16
TERMITE CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Soil treatment with termiticide.
 - 2. Wood treatment with borate.
 - 3. Bait-station system.
 - 4. Metal mesh barrier system.
- B. See Division 6 Section "Rough Carpentry" for wood preservative treatment by pressure process.
- C. See Division 7 Section "Sheet Metal Flashing and Trim" for custom-fabricated metal termite shields.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the EPA-Registered Label.
- B. Product certificates.
- C. Soil Treatment Application Report: Include the following:
 - 1. Date and time of application.
 - 2. Moisture content of soil before application.
 - 3. Brand name and manufacturer of termiticide.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes, and rates of application used.
 - 6. Areas of application.
 - 7. Water source for application.
- D. Wood Treatment Application Report: Include the following:
 - 1. Date and time of application.
 - 2. Brand name and manufacturer of borate.
 - 3. Quantity of undiluted borate used.
 - 4. Dilutions, methods, volumes, and rates of application used.
 - 5. Areas of application.
- E. Bait-Station System Application Report: Include the following:
 - 1. Location of areas and sites conducive to termite feeding and activity.
 - 2. Plan drawing showing number and locations of monitoring stations and bait stations.
 - 3. Dated report for each monitoring and inspection occurrence indicating level of termite activity, procedure, and treatment applied before time of Substantial Completion.

4. Brand name and manufacturer of termiticide.
5. Quantities of termite bait used.
6. Schedule of inspections for one year from date of Substantial Completion.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located, and who employs workers trained and approved by bait-station system manufacturer to install manufacturer's products.
- B. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.

1.04 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
 1. Warranty Period: Five years from date of Substantial Completion.

1.05 MAINTENANCE SERVICE

- A. Continuing Service: Beginning at Substantial Completion, provide 12 months continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions, and terms for agreement period; and terms for future renewal options.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Termiticides:
 - a. Aventis Environmental Science USA LP; Termidor.
 - b. Bayer Corporation; Premise 75.
 - c. Dow AgroSciences LLC.
 - d. FMC Corporation, Agricultural Products Group;
 - e. Syngenta; Demon TC.

2. Borates:
 - a. Nisus Corp.; Bora-Care, Jecta.
 - b. NovaGuard Technologies, Inc.; Armor-Guard, Shell-Guard.
 - c. U.S. Borax Inc.; Tim-Bor.
3. Bait-Station Systems:
 - a. Dow AgroSciences LLC; Sentricon System.
 - b. Ensystex, Inc.
 - c. FMC Corporation, Agricultural Products Group; First Line Systems.
4. Metal Mesh Barrier System:
 - a. TERMI-MESH, Inc.; TERMI-MESH

2.02 SOIL TREATMENT

- C. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

2.03 WOOD TREATMENT

- D. Borate: Provide an EPA-registered borate complying with requirements of authorities having jurisdiction, in an aqueous solution for spray application and a gel solution for pressure injection, formulated to prevent termite infestation in wood. Provide quantity required for application at the label volume and rate for the maximum diffusible borate concentration allowed for each specific use, according to product's EPA-Registered Label.

2.04 BAIT-STATION SYSTEM

- E. Provide bait stations and monitoring stations based on the dimensions of building perimeter indicated on Drawings, according to manufacturer's EPA-Registered Label for product, manufacturer's written instructions, and the following:
 1. Not less than 1 station per 20 linear feet.
 2. Not less than 1 cluster of stations per 20 linear feet, consisting of not less than 3 stations per cluster.

2.05 METAL MESH BARRIER SYSTEM

- F. Product: Subject to compliance with requirements, provide "TERMI-MESH" by TERMI-MESH, Inc.
- G. Stainless-Steel Mesh: 0.025-by-0.018-inch mesh of 0.08-inch- diameter, stainless-steel wire, Type 316.

PART 3 - EXECUTION

3.01 PREPARATION

- A. General: Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

3.02 APPLYING SOIL TREATMENT

- C. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 - 1. Slabs-on-Grade and Basement Slabs: Underground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 - 2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 - 3. Crawlspace: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
 - 4. Masonry: Treat voids.
 - 5. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- D. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- E. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- F. Post warning signs in areas of application.
- G. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.03 APPLYING BORATE TREATMENT

- H. Application: Mix wood treatment borate solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of borate, according to manufacturer's EPA-Registered Label, so that wood framing, sheathing, siding, and structural members subject to infestation receive treatment.
1. Framing and Sheathing: Apply borate solution by spray to bare wood for complete coverage.
 2. Wood Members Thicker Than 4 Inches: Inject borate gel solution under pressure into holes of size and spacing required by manufacturer for treatment.
 3. Exterior Uncoated Wood Trim and Siding: Apply borate solution to bare wood siding. After 48 hours, apply a seal coat of paint as specified in Division 9 painting Sections.

3.04 INSTALLING BAIT-STATION SYSTEMS

- I. Place bait stations and, if applicable, monitoring stations, according to the EPA-Registered Label for the product and manufacturer's written instructions, in areas that are conducive to termite feeding and activity, as follows:
1. Conducive sites and locations indicated on Drawings.
 2. In and around infested trees and stumps.
 3. In mulch beds.
 4. Where wood directly contacts soil.
 5. Areas of high soil moisture.
 6. Near irrigation sprinkler heads.
 7. Each area where roof drainage system, including downspouts and scuppers, drains to soil.
 8. Along driplines of roof overhangs without gutters.
 9. Where condensate lines from mechanical equipment drip or drain to soil.
 10. At plumbing penetrations through ground-supported slabs.
 11. Other sites and locations as determined by licensed Installer.
- J. Inspect and service stations from time of their application until completion of time period established by continuing service agreement, according to the EPA-Registered Label for product and manufacturer's written instructions for termite management system and bait products.
1. Service Frequency: Inspect monitoring stations no fewer than once every three months.

3.05 INSTALLING METAL MESH BARRIER SYSTEM

- K. Metal Mesh Barrier: Place metal mesh barrier where indicated to provide a continuous barrier to entry of subterranean termites.
1. Fit mesh tightly around pipe or other penetrations, and terminate at slab and foundation perimeters.
 2. Install mesh under the perimeter of concrete slab edges and joints after vapor barrier and reinforcing steel are in place, and comply with manufacturer's written installation methods.

END OF SECTION 31 31 16

SECTION 31 62 00 - DRIVEN PILES – CLASS 5

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. Furnish all labor, materials, tools, and equipment, and perform all operations necessary for piling work indicated or specified.
- B. This Section includes the furnishing and driving of the following types of piling:
 - 1. Treated Timber Piles.
- C. Noise, Vibration: Driving of piles during school operating hours is prohibited. It is the responsibility of the contractor to coordinate pile driving operations so as not to conflict with school's activities.

1.3 DAMAGE TO EXISTING PROPERTY

- A. Investigate the existing adjacent buildings, sewers, and utilities. Take proper and necessary precautions to protect those things from damage due to the execution of the Piling work. Should damage occur due to the Contractor's negligence, responsibility and cost for repairing or replacing the work in original condition shall be borne by the Contractor, without additional compensation.

1.4 SUBSURFACE INFORMATION

- A. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that the Contractor will be responsible for all interpretations or conclusions which he draws from the subsurface information. Data are made available in the office of the Architect for the convenience of Contractor.
- B. Additional soil borings and other exploratory operations may be made by Contractor at no cost to Owner.

1.5 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications.
 - 1. Treated Timber pile data.
 - 2. Pile installation equipment, including hammer and drill information.

3. Product Data: Submit manufacturer's specifications and instructions for manufactured materials and products/ Include manufacturer's certifications and laboratory test reports.

B. Reports:

1. Furnish independent testing laboratory reports of tests and inspections as required in this specification.

1.6 QUALITY ASSURANCE

A. The Contractor's independent testing laboratory shall perform the following:

1. Treated Timber Piles: Inspect at source of supply and hammer mark in the butt to indicate conformance with the requirements of these specifications.
2. Logging of pile driving: Log the driving of all piling including reaction piles and record the following:
 - a. Date driven.
 - b. Hammer description.
 - c. Dimensions of piles as measured on jobsite.
 - d. Location of pile.
 - e. Depth and size of predrill
 - f. Number of blows per foot for full length of pile. For exploratory piles, use painted foot marks for the entire length of each pile.
 - g. Submit driving records daily, no later than the morning after each completed day of pile driving.

B. Vibration Study: During the driving of all piles, the laboratory shall monitor and record the vibrations to adjacent and surrounding areas. The laboratory shall employ the services of a vibration specialist engineer who in conjunction with the laboratory shall render complete reports and interpretations of the data obtained, including the possible effects of the measured vibrations on adjacent and surrounding structures. The vibrations shall be measured by means of a portable Seismograph which directly measures particle velocity (rate of ground movement) in three mutually perpendicular directions (longitudinal, transverse, and vertical). Probes shall be located at various locations as directed. A complete report of the vibration study, including seismograms, shall be furnished after the conclusion of the driving of these piles. Peak particle velocities, measured at the surface, shall not exceed 0.25 inches per second. Should this limit be exceeded, pile driving operations shall be paused, and the Engineer of Record shall be contacted in order to coordinate a method to reduce pile driving vibration.

C. Notification Prior to Start of Pile Driving: The Contractor shall notify the Architect/Engineer and the testing laboratory a minimum of 48 hours prior to start of all pile driving activities.

D. Rejection of Materials: The Laboratory shall notify the Contractor or his authorized representative, of any materials which are not in full conformance with the Specifications, and the Architect shall be informed of such notification.

E. Exploratory Piles: The Contractor shall drive six (6) exploratory treated timber piles, having properties and dimensions as specified herein. Locations of the exploratory piles shall be as indicated on the Drawings.

- F. Additional Tests: The Architect reserves the right to require additional tests to those specified or upon materials not herein specified for testing. If such tests are necessary because of apparently defective materials or workmanship, the cost of these additional tests shall be borne by the Contractor.

PART 2 - PRODUCTS

2.1 TREATED TIMBER PILES

- A. Shall meet ASTM Designated D25 (latest revision) round timber piles for quality, clean peeled, Southern Pine with a minimum tip diameter of 6 inches and a minimum pile butt diameter of 8 inches.
 - 1. Treated Timber Test Piles shall meet ASTM Designated D25 (latest revision) round timber piles for quality, clean peeled, Southern Pine with a minimum tip diameter of 6 inches (6½" maximum) and a minimum butt diameter of 8 inches (9" maximum).
- B. Solution For Brush Treatment: Treatment solution containing a percentage of Copper Napthenante conforming to AWWA Specification M4.
- C. Preservative Treatment: Comply with AWWA Standards P5-08, U1-08 and T1-08 with minimum net retention of 0.80 lbs. per cu. ft. of wood and penetration as required for foundation piles. Preservative shall be CCA.
- D. Length: As indicated on the Drawings.
 - 1. Exploratory Pile Length shall be 5'-0" longer than Contract Piles.

PART 3 - EXECUTION

3.1 HANDLING

- A. Piles shall be carefully handled to prevent damage to timber piles.

3.2 EQUIPMENT

- A. Driving equipment is subject to the Architect's approval. Architect will reject equipment if in his opinion, at any time, the equipment does not perform its intended task adequately.

3.3 PREDRILL

- A. For each pile, predrill a 6 inch diameter hole to a 5 foot depth below the existing ground surface, using a Demon SH-800 wet-rotary type bit. Immediately thereafter drive the pile into the drilled hole. Use a minimum amount of water during predrilling operations. The Architect may require the Contractor to change the depth and size of predrill. If this is necessary, it shall be done at no additional cost to the Owner.

3.4 HAMMERS

- A. No. 2 Vulcan (7,260 ft. lbs. per blow) for all piles.

3.5 DRIVING PROCEDURE

- A. Driving of Contract Piles shall not start until all site preparation, fill placement and proof rolling operations within the building footprint are complete, in accordance with Section 312000.
- B. Driving shall be done with fixed leads that shall hold the pile firmly in position and in alignment with the hammer. The top of each pile before driving shall be cut at right angles to the longitudinal axis of the pile. The top of the pile shall be protected with a standard steel hood or similar-type device which will prevent damage to the pile during driving.
- C. Drive continuously until proper penetration as determined by the Architect is obtained.

3.6 LOCATION

- A. Piles shall be driven plumb and accurately into positions shown on Drawings: a maximum variation not exceeding 3" for each pile will be accepted as fulfillment of Contract, providing limiting and controlling conditions make it impossible to maintain more accurately the spacing indicated on plans. Maximum tolerance from the vertical shall be 1.5 feet in 100 feet. Should the variations from true center or vertical exceed the above, the piles in each cluster shall be plotted by the Contractor and the center of gravity of said cluster determined. If required, sufficient pile shall then be added at locations determined by the Architect. Contractor shall, at his own cost, drive such additional piling and/or alter pile caps as may be required to compensate for or to rectify the conditions brought about by failure to preserve proper spacing and plumbness, whether this defect is discovered before or after cutting off.

3.7 DEFECTIVE PILES

- A. Immediately remove and replace a pile that is damaged, deflected, broken, or which cannot be driven to proper elevation because of interference by underground obstruction. Replace such pile with an acceptable substitute pile at the location determined by the Architect. In the event that such pile's removal should prove to be impossible, abandon the defective pile; replace with an additional pile(s) driven close to the worthless one as directed by the Architect.

3.8 CUTOFF

- A. After driving, pile butts shall be cut-off to the required elevation on a neat horizontal plane and the cut-off portions shall be removed from the job site.

3.9 MISSING PILES

- A. Contractor shall be held responsible for any pile omitted; and missing piles at whatever stage of work discovered shall be provided without extra cost to the Owner.

END OF SECTION 31 62 00

SECTION 31 62 00 - DRIVEN PILES – CLASS B

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. Furnish all labor, materials, tools, and equipment, and perform all operations necessary for piling work indicated or specified.
- B. This Section includes the furnishing and driving of the following types of piling:
 - 1. Treated Timber Piles.
 - 2. Treated Timber Test Piles.
 - 3. A test pile program is included as part of the Work.

1.3 DAMAGE TO EXISTING PROPERTY

- A. Investigate the existing adjacent buildings, sewers, and utilities. Take proper and necessary precautions to protect those things from damage due to the execution of the Piling work. Should damage occur due to the Contractor's negligence, responsibility and cost for repairing or replacing the work in original condition shall be borne by the Contractor, without additional compensation.

1.4 SUBSURFACE INFORMATION

- A. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that the Contractor will be responsible for all interpretations or conclusions which he draws from the subsurface information. Data are made available in the office of the Architect for the convenience of Contractor.
- B. Additional soil borings and other exploratory operations may be made by Contractor at no cost to Owner.

1.5 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications.
 - 1. Treated/Untreated Timber pile data.
 - 2. Pile installation equipment, including hammer and drill information.
 - 3. Product Data: Submit manufacturer's specifications and instructions for manufactured materials and products/ Include manufacturer's certifications and laboratory test reports.

- B. Reports:
 - 1. Furnish independent testing laboratory reports of tests and inspections as required in this specification.

1.6 QUALITY ASSURANCE

- A. The Owner's independent testing laboratory shall perform the following:
 - 1. Treated Timber Piles: Inspect at source of supply and hammer mark in the butt to indicate conformance with the requirements of these specifications.
 - 2. Logging of pile driving: Log the driving of all piling including reaction piles and record the following:
 - a. Date driven.
 - b. Hammer description.
 - c. Dimensions of piles as measured on jobsite.
 - d. Location of pile.
 - e. Depth and size of predrill
 - f. Number of blows per foot for full length of pile. For exploratory piles, use painted foot marks for the entire length of each pile.
 - g. Submit driving records daily, no later than the morning after each completed day of pile driving.
- B. Vibration Study: During the driving of all piles, the laboratory shall monitor and record the vibrations to adjacent and surrounding areas. The laboratory shall employ the services of a vibration specialist engineer who in conjunction with the laboratory shall render complete reports and interpretations of the data obtained, including the possible effects of the measured vibrations on adjacent and surrounding structures. The vibrations shall be measured by means of a portable Seismograph which directly measures particle velocity (rate of ground movement) in three mutually perpendicular directions (longitudinal, transverse, and vertical). Probes shall be located at various locations as directed. A complete report of the vibration study, including seismograms, shall be furnished after the conclusion of the driving of these piles. Peak particle velocities, measured at the surface, shall not exceed 0.25 inches per second. Should this limit be exceeded, pile driving operations shall be paused, and the Engineer of Record shall be contacted in order to coordinate a method to reduce pile driving vibration.
- C. Notification Prior to Start of Pile Driving: The Contractor shall notify the Architect/Engineer and the testing laboratory a minimum of 48 hours prior to start of all pile driving activities.
- D. Rejection of Materials: The Laboratory shall notify the Contractor or his authorized representative, of any materials which are not in full conformance with the Specifications, and the Architect shall be informed of such notification.
- E. Exploratory Piles: The Contractor shall drive six (6) exploratory treated timber piles, having properties and dimensions as specified herein. Locations of the exploratory piles shall be as indicated on the Drawings.
- F. Load Test: The independent testing laboratory shall conduct two (2) static load tests on piles selected by the Engineer of Record. The load test shall have cyclic loads with rebounds and long term loading. The pile shall then be loaded to its ultimate capacity. Laboratory shall furnish an accurately calibrated hydraulic jack and load cell with a capacity of 50 tons. Reaction piles

shall be located a minimum distance of 8 feet clear between the outer surfaces of the test pile and reaction piles. Load test shall meet the requirements of the International Building Code. Application of load shall commence no sooner than 14 days after exploratory piles and reaction piles are driven.

Loading Procedure for the 20 ton design load piles shall be as follows:

Begin Load Test no sooner than fourteen (14) days after driving pile to be tested, and reaction piles.

Increment	Load (Tons)	Notes
1	2	
2	4	
3	6	Hold each increment 1 through 5 for 1 hour free of movement.
4	8	
5	10	
6	8	
7	6	Hold each decrement 5 through 8 for 15 minutes.
8	4	
9	2	
10	0	Hold for 1 hour free of movement.
11	2	Hold each increment 11 through 15 for 15 minutes.
12	4	
13	6	
14	8	
15	10	
16	12	Hold each increment 16 through 21 for 1 hour free of movement.
17	14	
18	16	
19	18	
20	20	
21	22	
		If pile begins to fail before reaching 40 tons , rebound in 4 equal decrements from failure load.
		2-ton increments to failure. Hold each increment for 1 hour free of movement. After failure, rebound in 4 equal decrements.

- G. Additional Tests: The Architect reserves the right to require additional tests to those specified or upon materials not herein specified for testing. If such tests are necessary because of apparently defective materials or workmanship, the cost of these additional tests shall be borne by the Contractor.

PART 2 - PRODUCTS

2.1 TREATED TIMBER PILES

- A. Shall meet ASTM Designated D25 (latest revision) round timber piles for quality, clean peeled, Southern Pine with a minimum tip diameter of 7 inches and a minimum butt diameter of 13 inches, three feet from the pile butt.
 - 1. Treated Timber Test Piles shall meet ASTM Designated D25 (latest revision) round timber piles for quality, clean peeled, Southern Pine with a minimum tip diameter of 7 inches (7½" maximum) and a minimum butt diameter of 13 inches (14" maximum).
- B. Solution For Brush Treatment: Treatment solution containing a percentage of Copper Napthenante conforming to AWPAs Specification M4.
- C. Preservative Treatment: Comply with AWPAs Standards P5-08, U1-08 and T1-08 with minimum net retention of 0.80 lbs. per cu. ft. of wood and penetration as required for foundation piles. Preservative shall be CCA.
- D. Length: As indicated on the Drawings.
 - 1. Exploratory Pile Length shall be 5'-0" longer than Contract Piles.

PART 3 - EXECUTION

3.1 HANDLING

- A. Piles shall be carefully handled to prevent damage to timber piles.

3.2 EQUIPMENT

- A. Driving equipment is subject to the Architect's approval. Architect will reject equipment if in his opinion, at any time, the equipment does not perform its intended task adequately.

3.3 PREDRILL

- A. For each pile, predrill a 7 inch diameter hole to a 30 foot depth below the existing ground surface, using a Demon SH-800 wet-rotary type bit. Immediately thereafter drive the pile into the drilled hole. Use a minimum amount of water during predrilling operations. The Architect may require the Contractor to change the depth and size of predrill. If this is necessary, it shall be done at no additional cost to the Owner.

3.4 HAMMERS

- A. No. 1 Vulcan (15,000 ft. lbs. per blow) for all piles.

3.5 DRIVING PROCEDURE

- A. Driving of Contract Piles shall not start until all site preparation, fill placement and proof rolling operations within the building footprint are complete, in accordance with Section 312001.

- B. Driving shall be done with fixed leads that shall hold the pile firmly in position and in alignment with the hammer. The top of each pile before driving shall be cut at right angles to the longitudinal axis of the pile. The top of the pile shall be protected with a standard steel hood or similar-type device which will prevent damage to the pile during driving.
- C. Drive continuously until proper penetration as determined by the Architect is obtained.

3.6 LOCATION

- A. Piles shall be driven plumb and accurately into positions shown on Drawings: a maximum variation not exceeding 3" for each pile will be accepted as fulfillment of Contract, providing limiting and controlling conditions make it impossible to maintain more accurately the spacing indicated on plans. Maximum tolerance from the vertical shall be 1.5 feet in 100 feet. Should the variations from true center or vertical exceed the above, the piles in each cluster shall be plotted by the Contractor and the center of gravity of said cluster determined. If required, sufficient pile shall then be added at locations determined by the Architect. Contractor shall, at his own cost, drive such additional piling and/or alter pile caps as may be required to compensate for or to rectify the conditions brought about by failure to preserve proper spacing and plumbness, whether this defect is discovered before or after cutting off.

3.7 DEFECTIVE PILES

- A. Immediately remove and replace a pile that is damaged, deflected, broken, or which cannot be driven to proper elevation because of interference by underground obstruction. Replace such pile with an acceptable substitute pile at the location determined by the Architect. In the event that such pile's removal should prove to be impossible, abandon the defective pile; replace with an additional pile(s) driven close to the worthless one as directed by the Architect.

3.8 CUTOFF

- A. After driving, pile butts shall be cut-off to the required elevation on a neat horizontal plane and the cut-off portions shall be removed from the job site.

3.9 MISSING PILES

- A. Contractor shall be held responsible for any pile omitted; and missing piles at whatever stage of work discovered shall be provided without extra cost to the Owner.

END OF SECTION 31 62 00

SECTION 32 13 13
CONCRETE PAVING

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

- 1. Sidewalks & Concrete Paving shown in Landscape Drawings
- 2. Concrete base under Unit Paving
- B. Related Sections:
 - 1. Section 031000 "Concrete Formwork"
 - 2. Section 032000 "Concrete Reinforcement"
 - 3. Section 033000 "Cast-in-Place Concrete" for general building applications of concrete.
 - 4. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
- C. Other Action Submittals:

1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For the following, from manufacturer:
 1. Cementitious materials.
 2. Steel reinforcement and reinforcement accessories.
 3. Admixtures.
 4. Curing compounds.
 5. Joint fillers.
- B. Material Test Reports: For each of the following:
 1. Aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
- C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated..
 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- C. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- D. ACI Publications: Comply with ACI 301 unless otherwise indicated.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Build mockups of full-thickness sections of concrete paving to demonstrate typical joints; surface finish, texture, and color; curing; and standard of workmanship.

2. Build mockups of each type of concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Landscape Architect and not less than 3 feet x 3 feet.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Landscape Architect specifically approves such deviations in writing.
- F. Preinstallation Conference: Conduct conference at Project site.
1. Review methods and procedures related to concrete paving, including but not limited to, the following:
 - a. Concrete mixture design.
 - b. Quality control of concrete materials and concrete paving construction practices.
 2. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Concrete paving subcontractor.

1.7 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from galvanized-steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 ; deformed.

- C. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
- E. Zinc Repair Material: ASTM A 780.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, gray portland cement Type I/II .
- B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source for exposed surfaces.
 - 1. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, ochre, or other materials that can cause stains on exposed concrete surfaces.
 - 2. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances. Dune sand, bank run sand and manufactured
 - 3.
 - 4. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
 - a. Crushed stone, processed from natural rock or stone.
 - b. Wash gravel, either natural or crushed. Use of slag and pit or bank run gravel is not permitted.
 - c. Coarse Aggregate Size: Size to be ASTM C33, No. 67.
- C. Water: Potable and complying with ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.

2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.5 RELATED MATERIALS

- A. Expansion Joints: Provide a semi-rigid, closed-cell polypropylene foam, preformed joint filler that meets the following physical property requirements and fully complies with ASTM D8139.

1. Compression Strength	30-60 psi	per ASTM D 545 or AASHTO T 42
2. Compression Recovery	> 80%	per ASTM D 545 or AASHTO T 42
3. Extrusion	< 0.1 in.	per ASTM D 545 or AASHTO T 42
4. Density	>3.5 lbs./cu.ft.	per ASTM D 545 or AASHTO T 42
5. Water Absorption	< 1.0%	per ASTM D 545 or AASHTO T 42
6. Heat Resistance °F	392°F± 5°F	per ASTM D 5249
7. Freeze Thaw Resistance	No change	per ASTM C 666 (300 cycles)
8. UV Weathering	No change	per ASTM D 4329 (1000 hrs., Cycle A)
9. Thickness	3/8"	
- B. Nomaflex expansion joints or approved equal.

2.6 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 , for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 - 2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4000 psi .
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
 - 3. Slump Limit: 4 inches , plus or minus 1 inch.

- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - 1. Air Content: 6 percent plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in concrete as required for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.7 CONCRETE MIXING

- A. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For concrete batches larger than 1 cu. yd. , increase mixing time by 15 seconds for each additional 1 cu. yd. .
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
 - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.

- 2. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000 "Earth Moving."
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Zinc-Coated Reinforcement: Use galvanized-steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 2. Provide tie bars at sides of paving strips where indicated.
 3. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys as indicated.
 4. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Expansion Joints: Form expansion joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
 1. Typical doweled expansion joint
 - a. Locate expansion joints as indicated on plan.
 - b. Extend joint fillers full width and depth of joint.
 - c. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated where keyway expansion joints are not used.
 - d. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - e. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - f. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Sawcut Control Joints:
 1. Sawcut control joints to be 1/8" wide. Depth shall be 1/4 the total depth of concrete slab.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/2 inch radius on all exposed edges, no radius on jointed edges. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F , uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- K. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control

- temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
 2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 SPECIALTY FINISHES

- A. Shotblast finish: After the concrete paving has appropriately cured, apply shotblasted finish with an appropriate shotblast machine to the level as indicated on drawings in the following manner:
 1. Medium Shotblast Finish: expose all fine aggregate to a medium sandpaper finish - Approximately Concrete Surface Profile (CSP) Level 5.
 2. Heavy Sandblast Finish: expose the surface and slight edges of the coarse aggregate, the aggregate should have a slight projection - Approximately CSP Level 7.
 3. Contractor shall provide mock-ups for each finish for Landscape Architect approval

3.9 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.

- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing moisture-retaining-cover curing compound or a combination of these as follows:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.10 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 - 1. Elevation: 1/4 inch .
 - 2. Thickness: Plus 3/8 inch , minus 1/4 inch .
 - 3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch .
 - 4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of tie bar.
 - 5. Lateral Alignment and Spacing of Dowels: 1/2 inch .
 - 6. Vertical Alignment of Dowels: 1/4 inch .
 - 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
 - 8. Joint Spacing: 3 inches .
 - 9. Joint Width: Plus 1/16 inch , no minus.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

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- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi .
- D. Test results shall be reported in writing to Landscape Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Landscape Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Landscape Architect..
- G. Concrete paving will be considered defective if it does not pass tests and inspections.

- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.12 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Landscape Architect.
- B. Drill test cores, where directed by Landscape Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 14 00

UNIT PAVING

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. Brick pavers set in mortar setting beds on concrete base with polymeric sand filled joints.
 - 2. Permeable Unit Pavers
- B. Related Sections:
 - 1. Section 312000 "Earth Moving" for establishment of subgrade elevations.
 - 2. Section 033100 "Cast In Place Concrete" for concrete base under unit pavers.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Submit to latex-additive manufacturer, for testing as indicated below, samples of paving materials that will contact or affect mortar and grout that contain latex additives.
 - 1. Use manufacturer's standard test methods to determine whether mortar and grout materials will obtain optimum adhesion with, and will be nonstaining to, installed pavers and other materials constituting paver installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For materials other than water and aggregates.
- B. Product Data: For the following:
 - 1. Pavers.
 - 2. Mortar setting materials.
 - 3. Joint sand materials.
- C. Adhesion and Compatibility Test Reports: From latex-additive manufacturer for mortar and grout containing latex additives.
- D. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C 136.
- E. Samples for Initial Selection: For the following:
 - 1. Each type of unit paver indicated.
 - 2. Joint materials involving color selection.
 - 3. Edge restraints involving color selection.
- F. Samples for Verification:
 - 1. Full-size units of each type of unit paver indicated.
 - 2. Joint materials.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.
- B. Mockups: Build sample panel to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Panel shall be 8 ft. x 8 ft. minimum, exhibiting the specified base, setting method, thickness, colors, jointing, pattern, finish, and workmanship. The accepted panel shall become the standard for the entire job and shall remain undisturbed until completion of the concrete unit paving.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - 2. Notify Landscape Architect seven days in advance of dates and times when mockups will be constructed.
- C. Substitutions: As approved by the Landscape Architect
- D. Preinstallation Conference: Conduct conference at project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store liquids in tightly closed containers protected from freezing.
- E. Store asphalt cement and other bituminous materials in tightly closed containers.

1.7 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.
- B. Weather Limitations for Sand:
 - 1. Joint sand to be applied only in dry conditions.

PART 2 - PRODUCTS

2.1 QUALITY

- A. Use new materials without flaws or defects.

2.2 SUBSTITUTIONS

- A. Specified product is only used to denote the general style, type, character, and quality standard of the product desired. Bidders are not restricted to the specified brand, make, or manufacturer.
- B. Use specified product, or pre-approved equal. Alternative products must be approved by Landscape Architect prior to bidding. Changes and associated design costs to accommodate alternative equipment are Contractor's responsibility.

2.3 BASE SLAB

- A. Cast-in-place concrete base with PVC formed vertical weeps: refer to Section 03 3100, Cast-in-Place Concrete

2.4 BRICK PAVERS

- A. Brick Pavers: Brick pavers shall be A-Grade pavers manufactured/supplied by a member of the Brick Institute of America (BIA) and shall be compliant with all City of New Orleans requirements for brick pavers along streets in the CBD-6.
- B. Manufacturer: Subject to compliance with requirements, provide products by one of the following or approved equal:
 - 1. Pine Hall Brick
P.O. Box 11044
2701 Shorefair Drive
Winston-Salem, NC 27116-1044
Phone: (800) 334-8689
www.pinehallbrick.com
 - a. Authentic Rumbled Pavers:
Thickness: 2 1/4-inches.
Face Size and Shape: 4-inches x 8-inches, rectangular.
Colors / Color Mix: Cocoa
 - 2. Glen-Gery
P.O. Box 7001
1166 Spring Street
Wyomissing, PA 19610-6001
Phone: (610) 374-4011
<https://www.glengery.com/>
 - a. Authentic Rumbled Pavers:
Thickness: 2 1/4-inches.
Face Size and Shape: 4-inches x 8-inches, rectangular.
Colors / Color Mix: Cocoa
 - 3. Approved Equal

2.5 PERMEABLE UNIT PAVERS

- A. Manufacturer:
 - 1. Hanover Architectural Products, Inc.
5000 Hanover Road
Hanover, PA 17331
Phone: (717) 637-0500
Toll Free: (800) 426-4242
Fax: (717) 637-7145

www.hanoverpavers.com

2. Approved Equal

B. Permeable Unit Paver - Concrete Paver Unit Style

1. Prest Paver
 - a. Thickness: 3"
 - b. Face Size and shape: 4" x 8"
 - c. Edge Profile: No Bevel / Square Edge
 - d. Color: Custom Color Matrix – Submit Samples to L.A. and Owner for Approval
 - e. Finish: Standard Tudor
 - f. Pattern: Standard Running Bond
 - g. Joint Size: Standard 1/16" butt joint formed by integral spacer tabs

C. Approved Equals: Under substitution provisions of Division 1

2.6 MORTAR SETTING-BED MATERIALS

- A. Mortar that meets or exceeds ANSI A118.4 requirements when mixed with water or a latex admixture, and is designed for installation of large format tile.
1. Portland Cement: ASTM C 150, Type I or Type II.
 2. Hydrated Lime: ASTM C 207, Type S.
 3. Sand: ASTM C 144.
 4. Latex Additive: Manufacturer's standard acrylic resin or styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed, and not containing a retarder
 5. Water: Potable.

2.7 MORTAR AND GROUT MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting-bed and joint materials of uniform quality and with optimum performance characteristics. Discard mortars and grout if they have reached their initial set before being used.
- B. Mortar-Bed Bond Coat: Mix neat cement and latex additive to a creamy consistency.
- C. Latex-Modified, Portland Cement Setting-Bed Mortar: Proportion and mix portland cement, sand, and latex additive for setting bed to comply with written instructions of latex-additive manufacturer and as necessary to produce stiff mixture with a moist surface when bed is ready to receive pavers.
- D. Latex-Modified, Portland Cement Bond Coat: Proportion and mix portland cement, aggregate, and liquid latex for bond coat to comply with written instructions of liquid-latex manufacturer.

2.8 SAND MATERIALS

- A. Sand for Joints
1. Manufacturer
 - a. TechniSeal, Inc., Boucherville, Canada J4B 7K2; Tel 800 363 7560; "Alliance DP SuperSand Bond" Polymeric Sand, manufactured by Alliance Designer Products, Inc., Laval, Canada, H7L 6A1; Tel 866 212 1611
 - b. Approved Equal

2. Type: Polymeric joint sand for pavement Joints
3. Provide sand of color needed to match pavers, for approval by Landscape Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Where pavers are to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.
- B. Proof-roll prepared subgrade according to requirements in Section 312000 "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for unit pavers.

3.3 INSTALLATION, GENERAL

- A. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
- D. Joint Pattern: See Drawings.
- E. Tolerances: Do not exceed 1/32-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet from level, or indicated slope, for finished surface of paving.

3.4 MORTAR SETTING-BED APPLICATIONS

- A. Saturate concrete sub-base with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.
- B. Apply mortar-bed bond coat over surface of concrete sub-base about 15 minutes before placing mortar bed. Limit area of bond coat to avoid its drying out before placing setting bed. Do not exceed 1/16-inch thickness for bond coat.
- C. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Before placing pavers, cut back, bevel edge, and remove and discard setting-bed material that has reached initial set.

- D. Place pavers before initial set of cement occurs. Immediately before placing pavers on mortar bed, apply uniform 1/16-inch- thick bond coat to mortar bed or to back of each paver with a flat trowel.
- E. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.

3.5 ROCK CURB INSTALLATION

- A. Rock Curbs shall be placed on directly on top of drainage mat after roof deck pavers have been installed
- B. Sections shall be connected with two (2) 3/8" dowels, and concrete adhesive per manufacturer recommendations.
- C. Seal back of joints with silicone-based sealant prior to installing planting medium

3.6 FIELD QUALITY CONTROL

- A. After removal of excess joint sand, check final elevations for conformance to the drawings

3.7 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
- B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.
- C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.
 - 1. Remove temporary protective coating as recommended by coating manufacturer and as acceptable to paver and grout manufacturers.
 - 2. Do not allow protective coating to enter floor drains. Trap, collect, and remove coating material.

END OF SECTION

SECTION 32 84 00

IRRIGATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes valves, piping, sprinklers, specialties, accessories, controls, and wiring for lawn and shrubbery irrigation systems.

1.3 DEFINITIONS

- A. Pipe sizes used in this Section are nominal pipe size (NPS) in inches. Tube sizes are standard size in inches. Equivalent SI (metric) sizes are indicated in millimeters (mm) in parentheses.
- B. Pressure piping: Piping downstream from point of connection to and including control valves. Piping is under irrigation system pressure. Piping in this category includes pressure regulators, water meters, and backflow preventers, when used.
- C. Circuit Piping: Piping downstream from control valves to irrigation system sprinklers, emitters, devices, and drain valves. Piping is under pressure (less than pressure piping) during flow.
- D. Control Valve: Manual or automatic (electrically operated) valve for control water flow to irrigation system zone.
- E. Drain Piping: Downstream from circuit piping drain valves. Piping is not under pressure.
- F. Drain Valve: Manual or automatic (pressure operated) drain valve for draining of irrigation system circuit piping.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. Location of Sprinklers and Devices: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards.
- B. Minimum Water Coverage: Contractor shall be responsible for 100% coverage for all irrigated areas.
- C. Components and Installation: Capable of producing piping systems with the following minimum pressure ratings: 50 psi static, 32 psi working
 - 1. Pressure Piping: 50 psi (static).

2. Circuit and Drain Piping: 32 psi (working).

1.5 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections:
- B. Materials List: Include sleeving, pipe, fittings, mainline components, sprinkler components, drip irrigation components, control system components, and other components shown on drawings and installation details or described herein. Include pipe sealant, wire, wire connectors, ID tags, and other miscellaneous items. Quantities of materials need not be included.
- C. Product Data: Submit manufacturer's product data including pressure rating, rated capacity, settings, and electrical data of selected models for the following if different than specified on plans:
 1. Backflow preventers, including size and test equipment
 2. Pressure regulators.
 3. Valves, including general-duty, underground, manual and automatic control, and quick coupler types, and valve boxes.
 4. Sprinklers, including emitters, bubblers, and devices.
 5. Controls, including controller wiring diagrams.
 6. Wiring.
 7. Any other component listed on material list.
- D. Shop Drawings: Contractor shall submit shop drawings to illustrate the following:
 1. Water meter size and location
 2. Backflow preventor size and location
 3. mainline layout
 4. Sprinkler head layout
 5. Controller location
 6. Layout of any other major components
- E. Maintenance data for inclusion in "Operating and Maintenance Manual" for:
 1. Backflow preventers, including instructions for testing.
 2. Pressure regulators.
 3. Automatic control valves.
 4. Sprinklers.
 5. Controllers.
- F. Warranty: Manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

- A. Comply with requirements of utility supplying water for prevention of backflow and back-siphonage.
- B. Comply with requirements of authority with jurisdiction for irrigation systems.

- C. Product Options: Irrigation system piping, specialties, and accessories are based on specific types, manufacturers, and models indicated. Components with equal performance characteristics produced by other manufacturers may be considered, provided deviations in dimensions, operations, and other characteristics do not change design concept or intended performance as judged by the Landscape Architect. The burden of proof of product equality is on the Contractor.

1.7 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations. Verify that irrigation system piping may be installed in compliance with original design and referenced standards.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate irrigation systems work with landscape work specified in Division 2 Section "Landscape Work."

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in clean, dry area in accordance with manufacturer's instructions. Keep materials in manufacturer's original, unopened containers and packaging until installation.
- C. Handling: Protect materials and finish during handling and installation to prevent damage.

1.10 TESTING

- A. Products will be free from defects in material and/or workmanship for a period of three years from the date of invoice. Schedule testing with Owner's Representative a minimum of three days in advance of testing.
- B. Mainline pipe jointed with rubber gaskets or threaded connections may be subjected to pressure test at any time after partial completion of backfill. Allow irrigation pipe jointed with solvent-welded PVC joints to cure at least 24 hours before testing.
- C. Subsections of mainline pipe may be tested independently, subject to review of Irrigation Engineer.
- D. Provide clean, clear water, pumps, labor, fittings, and equipment necessary to conduct tests or retests.
- E. Test Documentation:
 - 1. Submit a written report of all tests to Owner. Each test must list name of test, date of test, name of the individual completing the test, name of the company

- completing the test. Submit test documentation to Owner within three (3) days of completing test.
2. Hydraulic Pressure Test – Include starting and ending pressures. If pipe does not pass test, document reason for pressure loss.
 3. Copper Tracing Wire – Include voltage readings for length of tested wire. If wire does not pass test, document reason for voltage failure.
 4. Control System Grounding – Include identification of each grounding equipment by the remote control valve number and the ohms resistance to ground.
- F. Hydrostatic Pressure Test:
1. Subject mainline pipe to hydrostatic pressure equal to 120 PSI for two hours. Test with mainline components installed.
 2. Backfill to prevent pipe from moving under pressure. Expose couplings and fittings.
 3. Purge air from mainline pipe before test. Attach pressure gauge to mainline pipe in test section.
 4. Observe pressure loss on pressure gauge. If pressure loss is greater than 5 PSI, identify reason for pressure loss. Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until pressure loss is equal to or less than 5 PSI.
 5. Visually inspect irrigation pipe for leakage and replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until pipe passes test.
 6. Cement or caulking to seal leaks is prohibited.
- G. Operational Test:
1. Activate each remote control valve in sequence from controller. Provide either one additional person with radio or use handheld remote to activate remote control valves from controller. Manually activating remote control valve using manual bleed mechanism at remote control valve is not an acceptable method of activation. Owner's Representative will visually observe operation, water application patterns, and leakage.
 2. Replace defective remote control valve, decoder, solenoid, two wire cable, wiring, or appurtenance to correct operational deficiencies.
 3. Replace, adjust, or move water emission devices to correct operational or coverage deficiencies.
 4. Replace defective pipe, fitting, joint, valve, sprinkler, or appurtenance to correct leakage problems. Cement or caulking to seal leaks is prohibited.
 5. Repeat test(s) until each lateral passes all tests. Repeat tests, replace components, and correct deficiencies at no additional cost to Owner.
- H. Copper Tracing Wire:
1. Pass current through wire and demonstrate that wire is capable of locating all mainline pipe.
 2. If wire will not pass current, locate break in circuit, repair or replace wire or splice, and test until tracer wire works in accordance for its intended use.
- I. Control System Grounding:

1. Test for proper grounding of control system and two wire cable per manufacturer's recommendations. Test results must meet or exceed manufacturer's guidelines for acceptance.
 2. Replace defective wire, grounding rods, or appurtenances. Repeat test until manufacturer's guidelines are met.
- J. Testing Review:
1. Failure of initial testing review will require additional review. Payment of costs, including travel expenses and site visits by Owner's Representative, for additional reviews that may be required due to non-compliance with the Construction Documents will be Contractor's responsibility.
- K. Field Mock Up:
1. Fabricate an on-site example of the following assemblies for demonstration prior to construction. The mock-ups must be presented to the Owner's Representative and meet approval prior to construction.
 - a. Remote Control Valve Assembly: Mock-up is to include remote control valve, wire splices, two wire cable, and decoder.
 - b. Decoder Grounding: Mock-up is to include decoder, wire splices, and grounding equipment.

1.11 CONSTRUCTION REVIEW

- A. The purpose of on-site reviews by Owner's Representative is to periodically observe work in progress, Contractor's interpretation of construction documents, and to address questions with regard to installation.
- B. Schedule reviews for irrigation system layout or testing with Owner's Representative as required by these specifications.
- C. Impromptu reviews may occur at any time during project.
- D. A review will occur at completion of irrigation system installation and Project Record Drawing submittal.

1.12 WARRANTY

- A. Products will be free from defects in material and/or workmanship for a period of three years from the date of invoice.
- B. The warranty does not apply to damage resulting from accident, alteration, misuse, tampering, negligence, or abuse.
- C. Purchasers should be aware that normal use of these high quality products can result in superficial damage affecting the finish. Scratches, nicks, and dents are to be considered normal wear and tear, and are not the responsibility of the manufacturer.

PART 2 - PRODUCTS

2.1 QUALITY

- A. Use new materials without flaws or defects.

2.2 SUBSTITUTIONS

- A. Specified equipment is only used to denote the general style, type, character, and quality standard of the product desired. Bidders are not restricted to the specified brand, make, or manufacturer.
- B. Use specified equipment, or pre-approved equal. Alternative equipment must be approved by Landscape Architect prior to bidding. Changes and associated design costs to accommodate alternative equipment are Contractor's responsibility.
- C. Pipe sizes referenced in the construction documents are minimum sizes, and may be increased at Contractor's option.

2.3 PIPES AND TUBES

- A. Mainline Pipe and Fittings:
 - 1. Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, extruded from material meeting requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with integral belled end.
 - 2. Use Schedule 40, Type 1 pipe, conforming to dimensions and tolerances established by ASTM Standard D2241.
 - 3. Use solvent weld pipe for mainline pipe with nominal diameter less than or equal to 3-inches. Use Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784. Use primer approved by pipe manufacturer. Use solvent cement conforming to ASTM Standard D2564.
 - 4. Mainline pipe within sleeves: Use solvent weld pipe for mainline pipe with nominal diameter 3-inches and smaller installed within sleeves.
- B. Lateral Pipe and Fittings:
 - 1. Use rigid Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, extruded from material meeting requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with integral belled end suitable for solvent welding.
 - 2. Use Class 200, SDR-21, rated at 200 PSI, conforming to dimensions and tolerances established by ASTM Standard D2241SDR-26,. Use PVC pipe rated at higher pressures than Class 160 in cases where small nominal diameters are not manufactured in Class 160. Use solvent weld pipe for lateral pipe. Use Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784 for PVC pipe. Use primer approved by pipe manufacturer. Solvent cement to conform to ASTM Standard D2564, of type approved by pipe manufacturer.
- C. Specialized Pipe and Fittings:

1. Copper pipe: Use Type "K" rigid pipe conforming to ASTM Standard B88.
2. Use wrought copper or cast bronze fittings, soldered, flared mechanical, or threaded joint per installation details or local code. Use a 95-percent tin and 5-percent antimony solder.
3. Use dielectric union wherever copper-based metal (copper, brass, bronze) is joined to iron-based metal (iron, galvanized steel, stainless steel).
4. Ductile iron pipe: Use Class 50 conforming to ANSI A21.51 (AWWA C151). Use mechanical joints conforming to ANSI A21.10 (AWWA C110) and ANSI A21.11 (AWWA C111).
5. Galvanized steel pipe: use Schedule 40 conforming to ASTM Standard A53. Use galvanized, threaded, standard weight, malleable iron fittings.
6. Use PVC Schedule 80 nipples and PVC Schedule 40 or 80 threaded fittings for threaded pipe connections.
7. Joint sealant: Use non-hardening, nontoxic pipe thread sealant formulated for use on threaded connections and approved by pipe fitting or valve manufacturer.

2.4 COPPER TRACING WIRE

- A. Use American Wire Gauge (AWG) No. 12-1 solid copper, 600 volt, Type UF or PE cable, UL approved for direct underground burial.
- B. Color: Tracing wire must be of color different from that of any active two wire cable, control wire, or common wire. Wire color shall be continuous over entire length.
- C. Splices: Use 3M DBR/Y wire connector with waterproof sealant.

2.5 MAINLINE COMPONENTS

- A. Check Valve Assembly: as presented in drawings and installation details.
- B. Blow Out Assembly: as presented in drawings and installation details.
- C. Isolation Gate Valve Assembly: as presented in drawings and installation details.
- D. Quick Coupling Valve Assembly: as presented in drawings and installation details.

2.6 SPRINKLER IRRIGATION COMPONENTS

- A. Check Remote Control Valve (RCV) Assembly for Sprinkler Laterals:
 1. Rainbird PESB
 2. Approved Equal
- B. Sprinkler Assembly: as presented in drawings and installation details.

2.7 JOINING MATERIALS

- A. Solvent Cement: ASTM F 656 primer and ASTM D 2564 solvent cement.

2.8 BACKFLOW PREVENTERS

- A. See Plumbing Drawings.

2.9 AUTOMATIC CONTROL SYSTEM

- A. See Drawing for Irrigation Systems Components List.
- B. Irrigation Controller Assembly:
 - 1. Controller
 - a. Rainbird ESP-LXD 2-wire Decoder Controller
 - b. Approved Equal
 - 2. Controller Assembly Enclosure: As presented in drawings and installation details.
 - 3. Electrical conduit: Use PVC Schedule 40 conduit conforming to dimensions and tolerances established by ASTM Standard D-1785. Use Schedule 40, Type 1, PVC solvent weld sweep fittings for PVC conduit conforming to ASTM Standards D2466 and D1784 for buried installations. Use rigid metallic conduit with sweep elbows for above grade installations.
 - 4. Lightning protection: As presented in drawings and installation details.
 - 5. Wire markers: Prenumbered or labeled with indelible nonfading ink, made of permanent, nonfading material.
- C. Two Wire Cable From Controller to Decoders:
 - 1. Use two wire cable per controller manufacturer's guidelines.
 - 2. Splices
 - a. 3M DBR/Y wire connector with waterproof sealant.
 - b. Approved Equal
 - 3. Electrical conduit: Use PVC Schedule 40 conduit conforming to dimensions and tolerances established by ASTM Standard D-1785. Use Schedule 40, Type 1, PVC solvent weld sweep fittings for PVC conduit conforming to ASTM Standards D2466 and D1784 for buried installations. Use rigid metallic conduit with sweep elbows for above grade installations.
 - 4. Warning tape: Inert plastic film highly resistant to alkalis, acids, or other destructive chemical components likely to be encountered in soils. Three inches wide, colored red, and imprinted with "CAUTION: BURIED ELECTRIC LINE BELOW."
- D. Low Voltage Control Wire from Solenoid Valve to Decoder:
 - 1. Use American Wire Gauge (AWG) No. 14-1 solid copper, 600 volt, Type UF or PE cable, UL approved for direct underground burial for individual control wires from the decoder to each remote control valve assembly.
 - 2. Color: Use colors same as decoder station wires. Use easily distinguished colors for other control wires. Wire color shall be continuous over entire length.
 - 3. Use 3M DBR/Y wire connector with waterproof sealant.
- E. Instrumentation:
 - 1. As presented in the drawings and installation details.
- G. Rain Check: WR2-RFC-48. Location to be verified with Landscape Architect.

- H. Controller Mount: Wall mounted – see irrigation drawings for location.
- I. Other Components
 - 1. Tools and Spare Parts: Furnish operating keys, servicing tools, test equipment, spare parts and other items indicated in drawings and specifications.
 - 2. Other Materials: Provide other materials or equipment shown on drawings or installation details that are part of irrigation system, even though items may not have been referenced in specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Investigate and determine available water supply water pressure and flow characteristics.

3.2 PREPARATION

- A. Set stakes to identify proposed sprinkler locations. Obtain landscape Architect's approval before excavation.

3.3 PIPING APPLICATIONS

- A. Refer to Part 2 of this Section for detailed specifications for pipe and fittings products listed below. Use pipe, tube, fittings, and joining methods according to the following applications. Piping in pits and above ground may be joined with flanges instead of joints indicated.
- B. Use pipe, tube, fittings, and joining methods according to the following applications.
 - 1. Pressure Piping Above ground: Use the following:
 - a. ASTM D 1785, Schedule 40 PVC pipe, ASTM D 2466 Schedule 40 PVC fittings, solvent cemented joints.
 - 2. Pressure Piping Underground: Use the following:
 - a. Main Lines - ASTM D 2466 Schedule 40 PVC, ASTM D 2466 Schedule 40 PVC fittings, and solvent cemented joints
 - b. Lateral Lines - ASTM D 1785 Class 200 PVC pipe, ASTM D 2466 Schedule 40 PVC fittings, and solvent cemented joints
 - c. HDPE Pipe: Lateral piping in sleeves under building shall be 1" HDPE.
 - 3. Circuit Piping: Use the following:
 - a. ASTM D 1785 Class 200 PVC pipe, ASTM D 2466 Schedule 40 PVC fittings, and solvent cemented joints.
 - 4. Swing Joints: Use the following:
 - a. ASTM D1785 Schedule 40 PVC pipe, ASTM D 2466 Schedule 40 PVC fittings, and solvent cemented joints. (use only for 'rotor' type heads).

- b. Plastic piping made for this application “Funny Pipe” shall be used instead of pipe and fittings specified for all ‘spray’ type heads.
- 5. Sleeves: ASTM D 1785, Schedule 40, polyvinyl chloride (PVC) plastic pipe; ASTM D 2466, Schedule 40, PVC plastic, socket-type fittings and solvent-cemented joints.

3.4 JOINT CONSTRUCTION

- A. Polyvinyl Chloride (PVC) Piping Solvent-Cemented Joints: Construct joints according to ASTM D 2672 and ASTM D 2855.
 - 1. Handling of Solvent Cements, Primers and Cleaners: Comply with procedures in ASTM F 402 for safe handling when joining plastic pipe and fittings with solvent cements.

3.5 PIPING SYSTEMS – COMMON REQUIREMENTS

- A. General Locations and Arrangements: Drawings indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, and in other design considerations. Install piping as indicated, except where deviations to layout are approved on coordination drawings.
- B. Install components having pressure rating equal to or greater than system operating pressure.
- C. Install piping free of sags and bends.
- D. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- E. Install fittings for changes in direction and branch connections.

3.6 PIPING INSTALLATION

- A. Install underground piping according to ASTM D 2774.
- B. Lay piping on solid sub-base, uniformly sloped without humps or depressions.
 - 1. Slope exhaust header in drip system down toward drain valve minimum of ½ inch in 10 feet (1:240).
 - 2. Install polyvinyl chloride (PVC) plastic pipe in dry weather when temperature is above 40 deg F (4 deg C). Allow joints to cure at least 24 hours at temperature above 40 deg F (4 deg C) before testing, unless otherwise recommended by manufacturer.
- C. Drain Pockets for Drip System: Excavate to a minimum of 12” x 12”.
 - 1. Backfill with cleaned gravel or crushed stone, graded from 3 inches (75mm) to ¾ inch (19mm) minimum.
- D. Minimum Cover: Provide following minimum cover over top of buried piping:
 - 1. Pressure Piping: Greater depth of minimum of 24 inches (915 mm) below finished grade, or not less than 18 inches (460 mm) below average local frost

depth.

2. Circuit Piping: 12 inches (300 mm).
 3. Drain Piping: 12 inches (300 mm).
 4. Sleeves: 24 inches (600 mm).
 5. Drip tube: 2"
- E. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed, by tunneling, boring, or jacking.
- F. Install piping under sidewalks and paving in sleeves provided.

3.7 VALVE INSTALLATION

- A. Valves: Install underground valves in valve boxes.
- B. Control Valves: Install in valve control valve boxes, arranged for easy adjustment and removal. Install union on downstream side.

3.8 WATER METER INSTALLATION

- A. Install one appropriately-sized water meter that will be dedicated to irrigation system. Coordinate meter size with the local municipality or regulatory agency. Locate meter per layout on Drawings.

3.9 BACKFLOW PREVENTER INSTALLATION

- A. Contractor shall install the backflow prevention device at the location as shown on the Drawings.

3.10 SPRINKLER INSTALLATION

- A. Sprinklers: Flush circuit piping with full head of water and install sprinklers after hydrostatic test is completed.
1. Install sprinklers at manufacturer's recommended heights.
 2. Locate sprinklers to maintain a minimum distance of 4 inches (100 mm) from walls and other structures, unless otherwise indicated.

3.11 AUTOMATIC CONTROL SYSTEM INSTALLATION

- A. Install control wiring in same trench with piping.

3.12 CONNECTIONS

- A. Connect piping to sprinklers, devices, valves, control valves, specialties, and accessories.
- B. Connect water supplies to irrigation systems. Include backflow preventers on potable water supplies.
- C. Electrical Connections: Connect to power source, controllers, and automatic control

valves.

- D. Ground system

3.13 FIELD QUALITY CONTROL

- A. Testing: Perform hydrostatic test of piping and valves before back-filling trenches. Piping may be tested in sections to expedite work.
 - 1. Cap and subject the piping system to a static water pressure of 50 psi above the operating pressure without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - 2. Repair leaks and defects with new materials and retest system of portion thereof until satisfactory results are obtained

3.14 CLEANING AND ADJUSTING

- A. Flush dirt and debris from piping before installing sprinklers and other devices.
- B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.
- C. Adjust settings of controllers and automatic control valves.

3.15 COMMISSIONING

- A. Starting Procedures: Follow manufacturer's written procedures. If no procedures are prescribed by manufacturers, proceed as follows:
 - 1. Verify that specialty valves and their accessories have been installed correctly and operate correctly.
 - 2. Verify that specified tests of piping are complete.
 - 3. Check that sprinklers and devices are correct type.
 - 4. Check that damaged sprinklers and devices have been replaced with new materials.
 - 5. Check that potable water supplies have correct type backflow preventers.
 - 6. Energize circuits to electrical equipment and devices.
 - 7. Adjust operating controls.
- B. Operational Testing: Perform operational testing after hydrostatic testing is completed, backfill is in place, and sprinklers are adjusted to final position.

3.16 DEMONSTRATION

- A. Demonstrate to Landscape Architect that system meets coverage requirements and that automatic controls function properly.
- B. Demonstrate to Owner's maintenance personnel operation of equipment, sprinklers, specialties, and accessories. Review operating and maintenance information.

- C. Provide 7 days' written notice in advance of demonstration.

3.17 WARRANTY

- A. Contractor shall warranty entire system to be complete and operational for a period of one year from the date of final project acceptance.

END OF SECTION 32 84 00

SECTION 32 93 00
PLANTS

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. Excavation as required for all planting and backfilling tree pits.
 2. Minor filling and leveling as necessary to insure survival of plants in all areas.
 3. Furnishing, transporting, preparing and placing of prepared topsoil for plant beds.
 4. Bed preparation.
 5. Steel Landscape Edging
 6. Furnishing and planting of tree, shrubs, and ground covers as indicated on Drawings.
 7. Staking trees.
 8. Samples and analyses for approval.
 9. Maintenance during Period of Establishment (365 days), and one-year plant material guarantee.
 10. Landscape gravel
 11. Replacement of unsatisfactory plant material.
- B. Related Sections:
1. Section 015639 "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.
 2. Section 311000 "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
 3. Section 312000 "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
 4. Section 329200 "Turf and Grasses" for turf (lawn)

1.3 DEFINITIONS

- A. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly

supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

- C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- D. Finish Grade: Elevation of finished surface of planting soil.
- E. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- F. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- G. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- H. Planting Area: Areas to be planted.
- I. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- J. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
- K. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
- L. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
- M. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- N. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- O. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- P. Contractor: The term "Contractor" as referred to in this section only means the Landscape Contractor. The Landscape Contractor shall be currently licensed by the

Louisiana Horticulture Commission to do landscape contracting work in the State of Louisiana.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, including soils.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
 - 2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
 - 3. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
 - 4. Steel Landscape Edging
- B. Samples for Verification: For each of the following:
 - 1. Mulch: 1-quart volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
 - 2. Steel Landscape Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.
 - 3. Tree Staking System: Submit 1 full staking system for review
 - 4. Rock and Gravel Types: 1-quart volume of rock or gravel type required; in sealed plastic bags labeled by type. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, and texture.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
- B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
 - 1. Manufacturer's certified analysis of standard products.
 - 2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
- C. Material Test Reports: For standardized ASTM D 5268 topsoil existing native surface topsoil existing in-place surface soil and imported or manufactured topsoil.

- D. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.
- E. Warranty: Sample of special warranty.

1.6 APPLICABLE STANDARDS

- A. Work shall be in strict accordance with sound nursery practice. The following documents, used as standards, are to be considered part of these Specifications.
 - 1. American Standard for Nursery Stock, Latest edition, as published by the American Association of Nurserymen, Inc.
 - 2. Standardized Plant Names, latest edition, as adopted by the American-Joint Committee on Horticultural Nomenclature.
 - 3. Grades and Standards for Landscape Materials, latest edition, as prepared by the Louisiana Association of Nurserymen, Inc.

1.7 SPECIAL LANDSCAPE PROVISIONS

- A. Contractor: The term "Contractor" as referred to in this section only means the Landscape Contractor. The Landscape Contractor shall be currently licensed by the Louisiana Horticulture Commission to do landscape contracting work in the State of Louisiana.
- B. Water: All proposed landscaping is to be irrigated under an automatic irrigation system. It is the Contractor's responsibility to insure proper scheduling and quantity of watering of all plant material.
- C. Finished Grading: It shall be the Contractor's responsibility to do whatever additional fine grading as may be required to bring areas to be planted back up to the existing finished grades or to grades specified on the Drawings or these Specifications. This shall also apply to existing slopes, berms, or lawn areas damaged during the Work herein, and the Contractor shall replace or repair and such existing area to return it to its original grade or condition.
- D. Disposal of Waste Materials: Reusable items are to be removed and stored in such a manner that they may be used again. The Owner shall have priority for the selection of salvaged equipment and materials. Any excess soil and/or other materials determined to remain as the property of the Owner shall be removed and delivered to a location as designated by the Owner. Materials not retained by the Owner shall become the property of the Contractor and shall be removed from the site by the Contractor.
- E. Period of Establishment and Replacement
 - 1. Upon the completion of planting, and providing plants are in place, living and conform to these Specifications, this portion of the Contract will be given provisional acceptance.
 - 2. The Contractor shall be responsible for replacing dead, damaged, or unhealthy plant materials and in general insuring proper plant growth by watering as needed for a Period of Establishment, which shall be 365 calendar days after the

provisional acceptance is made. Plant materials shall be guaranteed for a period of one year after provisional acceptance.

3. Plant materials, which have partially died so that the shape, size, or symmetry has been damaged, shall be considered subject to replacement. In such case, the opinion of the owner shall be final.
4. Plants used for replacement shall be of the same quantity, size, kind and quality as those originally planted, and they shall be planted as originally specified. This extra work, including materials, labor, and equipment used in replacements, shall be at no cost to the Owner. Replaced plants shall carry the same establishment period as the original. Damage, including ruts in lawn or bed areas, existing utilities, paving, and other improvements, incurred in making replacements shall be immediately repaired to the satisfaction of the Owner.
5. At the direction of the Owner, plants may be replaced at the start of the next year's planting or digging season, but in such cases, dead plants shall be removed from the premises immediately.
6. The Contractor agrees that for the Period of Establishment, he will water the plants during dry periods.
7. This replacement guarantee does not apply where plants die after final acceptance because of injury by storm, hail, non-treatable insects and diseases, or vandalism.
8. Final acceptance will be made only if all plants are in place, living, and are in conformance with the Drawings and these special provisions.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
 1. Experience; Five years' experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements."
 2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 3. Pesticide Applicator: State licensed, commercial.
- B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.}
- C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
 1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
 2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Landscape Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.

3. Report suitability of tested soil for plant growth.
 - a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
- D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
- E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
 1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
 2. Other Plants: Measure with stems, petioles, and foliage in their normal position.
- F. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
 1. Notify Landscape Architect of sources of planting materials seven days in advance of delivery to site.
- G. Pre-installation Conference: Conduct conference at Project site.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
- C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- D. Handle planting stock by root ball.
- E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 2. Do not remove container-grown stock from containers before time of planting.
 3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.10 PROJECT CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:
 1. Notify Landscape Architect and Owner no fewer than three days in advance of proposed interruption of each service or utility.
 2. Do not proceed with interruption of services or utilities without Landscape Architect's or Owner's written permission.
- C. Planting Restrictions: Plant during normal planting seasons. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
- D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.
- E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.11 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
 - b. Structural failures including plantings falling or blowing over.
 - c. Faulty performance of tree stabilization metal edgings.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Periods from Date of Substantial Completion:
 - a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
 - b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.
 - c. Annuals: Three months.
3. Include the following remedial actions as a minimum:
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
 - d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.12 MAINTENANCE SERVICE

- A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.
1. Maintenance Period: Twelve (12) months from date of Substantial Completion.
- B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.
1. Maintenance Period: Twelve (12) months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. General: Furnish No. 1 grade or better nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots will be rejected.
 2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
- B. Quality and Size
1. Specific requirements concerning the various species, sizes, and manner in which they are to be furnished are shown on the Plans and Plant List.
 2. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.
 3. Plants and trees shall equal or exceed the measurements specified in the Plant List, which are minimum acceptable sizes. They shall be measured before pruning, with branches in normal position. Dimensions for height and spread as contained herein refer to the main body of the plant and not from branch tip to branch tip. No pruning of branches to obtain the required height shall be done before the plants are delivered to the site unless so approved by the Owner.
 4. Stock furnished in a size range specified shall be interpreted to mean that not less than fifty percent (50%) shall be of the maximum size specified.
 5. The determining measurements for the trees shall be the caliper and/or height as described in the Plant List. Caliper shall be taken three (3) feet above the top of the root ball.
 6. Plants larger in size than specified in the Plant List may be used if approved by the Owner, but the use of larger plants shall not increase the contract price. If the use of larger plants is approved, the ball of earth shall be increased in proportion to the size of the plant.
 7. Plants shall have a habit growth, which is normal for the species and shall be sound, healthy, vigorous, and free from insect pests, plant diseases, injuries, and aftereffects thereof.

8. Nursery grown plants shall mean plants, which are healthy, vigorous, plants, lined out in rows in a nursery and which are cultivated, sprayed, pruned, and fertilized in accordance with good horticulture practice.
 9. No trees, which have had their leaders cut, or have been damaged so that cutting is necessary, will be accepted.
 10. Plants lacking compactness or proper proportions and plants injured by being planted too close in nursery rows will not be accepted.
 11. Plants shall be freshly dug or containerized; neither heeled-in plants nor plants from cold storage will be accepted. Nursery grown plants shall have been transplanted or root pruned at least once in the past three years.
 12. Plants designated "B&B" in the Plant List shall be balled and burlapped. Requirements for the measurement, branching, grading, quality, balling and burlapping of the plants generally follow the code of standards in the "American Standard of Nursery Stock". They shall be dug with firm, natural balls of earth sufficient diameter and depth to encompass the plant. Balls shall be firmly wrapped with burlap or similar material and bound with twine or cord. Plants with a rootball greater than or equal to 20 inches in diameter shall be placed in a properly sized wire basket for transport and handling. After planting, the wire basket is to be cut away and removed. Any plant with a loose soil ball or broken ball at the time of planting will be rejected.
 13. The balls of "B&B" plants, which cannot be planted immediately on delivery, shall be covered with moist soil or mulch, or other protection from drying winds and sun. Bare rooted plants will not be allowed. Plants shall be watered as necessary by the Contractor until planting.
 14. Plants grown in containers shall be fully rooted throughout the earth ball within the container, but not root bound. Container plants must be acclimated to area conditions.
- C. Shape and Form:
1. Plant material shall be symmetrical, typical for the variety and species, and shall conform to the measurements specified in the Plant List. Plants used where symmetry is required shall be matched as nearly as possible.
 2. Plants meeting the requirements specified in the Plant List, but not possessing a normal balance between height and spread will be rejected.
 3. No plant shall be bound with wire or rope at any time so as to damage the bark or break the branches. After planting, wires and ropes will be removed.
- D. Inspection / Rejection: The Owner may inspect plants at place of growth, but such inspection does not preclude the right of rejection on site. Any materials may be rejected if, in the opinion of the Owner, such does not meet the requirements of the Plant List, Drawings, or Specifications. Rejected materials shall be removed from the site by the Contractor at no cost to the Owner.
- E. Plant Material Selection: Contractor shall make provision for Owner approval of all plant material to be used prior to installation (except those plant materials pre-selected by Owner). Approval of plant material may require a site visit to nursery or field where

material is grown. Expense of any site visit for plant material approval/selection will be the responsibility of the contractor.

- F. Substitutions: Will not be permitted without approval of Landscape Architect. If proof is submitted that any plant specified is not reasonably obtainable, a proposal will be considered for the use of the nearest equivalent size or variety with an equitable adjustment of Contract price. Notification of possible substitutions prior to award of Contract will be made at least 7 DAYS prior to bid opening.
- G. Quantities: Quantities necessary to complete the planting as shown and located on the Drawings shall be furnished. Dimension for ground cover beds have, in all instances, been established from scaled drawings. It is the Contractor's responsibility to check these dimensions on the site and allow for correct quantity of plants accordingly.
- H. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- I. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.
- J. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.
- K. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 SOIL PREPARATION MATERIAL

- A. Topsoil: Topsoil shall be fertile, friable soil obtained from well drained arable land. It shall be free draining, non-toxic and capable of sustaining healthy plant growth. Topsoil shall be reasonably free of calcium carbonate, subsoil, refuse, roots, and other deleterious substances. The contractor shall furnish a written soil analysis prepared by an accredited soil analyst. The analysis shall indicate pH, total soluble salts, and plasticity index and particle size gradation.
- B. Sand: Sand shall be loose, granular soil containing particles smaller than gravel but coarser than silt. Sandy soil shall obtain a minimum of 90% sand and no greater than 5% clay.
- C. Peat Moss: Peat moss shall be imported Canadian sphagnum peat moss, brown, low in content of woody material and free of any mineral matter harmful to plant life. Peat moss shall have an acid rating of approximately 4.5 pH and have a water absorbing capacity of 1100 to 1200 % by weight. Peat moss shall be thoroughly pulverized before use except when used as a top-dressing. No native or sedge peats shall be approved.
- D. Organic Soil Conditioner: Organic soil conditioner shall be partially decomposed ground pine bark. Sawdust will not be accepted. Particle size and surface area shall be such as

to resist displacement by wind or by surface storm water or irrigation runoff for two growing seasons.

- E. Commercial Fertilizer: Fertilizer shall be a complete, slow release, 12-6-6 fertilizer or approved alternate delivered in original unopened containers bearing the manufacturer's guaranteed analysis. To be applied at manufacturer's recommended rate.
- F. Herbicide: Snapshot brand pre-emergent herbicide manufactured by Dow Agra or approved equal, applied at manufacturer's recommendations.
- G. Composted Cow Manure: Composted cow manure shall be a minimum of 50% cow manure by weight. Contractor to provide sample and analysis for approval by Landscape Architect.
- H. Standard Planting Bed Mix: This mix shall be used for all planting bed areas and pits unless otherwise noted and shall consist of:
 - 1. 1 CY Organic Soil Conditioner per 50SF of bed area
 - 2. 1 CY Composted Cow Manure per 150SF of bed area
 - 3. 1 3.8 CF Bale of Peat Moss or coffee chaff per 50SF of bed area
 - 4. Sandy Topsoil may be added to be planting mix if the existing soil is of poor quality. The Landscape Architect will make this determination prior to beginning of work.
 - 5. Commercial Fertilizer and Pre-emergent Herbicide per manufacturer's recommendations.
 - 6. Topdressing shall be Standard Bed Mulch as listed below.
 - 7. Substitutions may be made on the advice of the Landscape Architect.

2.3 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus.

2.4 STEEL LANDSCAPE EDGING

- A. Manufacturers:
 - 1. Colmet
 - 2. JD Russel
 - 3. Steel flat bar stock
 - 4. Approved equals
- B. Steel Landscape Edging. Comply with ASTM A 569, hot-rolled, standard flexible carbon steel landscape edging, fabricated in sections with stake pockets stamped or pre-punched into face of sections at 30" o.c. Steel landscape edging (header) shall be double staked at

overlap joints, and designed to receive tapered steel stakes. Standard steel flat bar stock may also be utilized.

- C. Size: 1/4" Thick x 4" wide
- D. Finish: Raw Steel. Provide sample to Landscape Architect for approval.
- E. Anchors:
 - 1. For pre-punched landscape edging: Anchor stakes shall be 1/4" thick x 1" wide (tapered) x 18" long prefabricated stakes provided by the landscape edging manufacturer for use in the stamped pockets
 - 2. For flat bar stock: Cut #3 rebar into 18" long sections and weld to the planting bed side of the landscape edging @ 30" O.C. max. Top of rebar shall be 1" min. below top of edging
 - 3. J-Hook style anchors or similar anchors that overlap the top of the edging shall not be accepted.

2.5 LANDSCAPE GRAVEL

- A. Smooth Brown Gravel
 - 1. 1" – 2" Diameter smooth brown rock, washed. Sides shall be mostly rounded and smooth with varying sizes and shapes. Depth of gravel as noted on the Drawings. Submit Sample for L.A. Approval.
 - 2. Used around base of building in the maintenance trough and as noted on the Drawings.
- B. Rain Garden Gravel
 - 1. 3"-4" Diam Diameter smooth brown rock, washed. Sides shall be mostly rounded and smooth with varying sizes and shapes. Depth of gravel as noted on the Drawings. Submit Sample for L.A. Approval.
 - 2. Use as the top gravel layer along the rain garden flow lines as indicated on Drawings.

2.6 MULCHES

- A. Standard Bed Mulch: Pine Straw. Shall be un-dyed pine straw of sufficient character to resist displacement by wind or storm water or by irrigation runoff. Pine straw to be freshly harvested, uniform in color, and free of deleterious materials. Contractor is required to submit a sample to Landscape Architect for approval prior to placing. Pine Straw Mulch shall be used as top dressing for all bed, and tree areas. Retain appropriate materials in first subparagraph below.
- B. Modified Bed Mulch: Composted Shredded Hardwood. Mulch shall be un-dyed premium grade decomposed shredded hardwood of sufficient character to resist displacement by wind or storm water or by irrigation runoff. Composted shredded hardwood to be uniform in color and free of deleterious materials. Contractor is required to submit a sample to Landscape Architect for approval prior to placing. Composted Shredded Hardwood Mulch shall be used beneath existing live oak trees in a two-inch layer as indicated on plan. See plan and details for locations and specified depth.

2.7 PESTICIDES & HERBICIDES

- A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
- C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.8 TREE STABILIZATION MATERIALS

- A. Root-Ball Stabilization Materials:
 - 1. Root-Ball Stabilization Devices: At- or below-grade stabilization systems to secure each new planting by root ball; sized per manufacturer's written recommendations unless otherwise indicated.
 - a. Products: Subject to compliance with requirements, provide the following or approved equal:
 - 1) Foresight Products, LLC; Duckbill Rootball Fixing System
6430 East 49th Drive
Commerce City, CO 80022
USA Contact: Matthew Esquibel
Phone: 800-325-5360 / 303 286-8955
E-mail: mesquibel@earthanchor.com
 - 2) Tree Frog Environmental Products; Tree Frog RBK System
411 N. Donnelly St
Mount Dora, FL 32757
Phone: 1-352-735-7411
Fax: 1-352-735-7412
E-mail: info.treefrogep@gmail.com
 - 3) Approved Equals.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline,

diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.2 GENERAL PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- E. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 TREE AND PLANTING BED PREPARATION

- A. General:
1. Time and Planting: Planting operations shall be conducted under favorable weather conditions during the seasons, which are normal for such work as determined by accepted practice in the locality.
 2. Preparation for Planting Operations: Before planting operations are begun, existing turf areas which are to be trucked over or upon which soil is to be temporarily stacked pending its reuse or removal, or turf areas which may be subject to abuse of any other kind, shall be covered in a manner which will satisfactorily protect such areas from damage.

3. Plant Material Locations: As shown on the drawings are diagrammatic, and the exact locations shall be approved by the Owner. Shade and ornamental trees shall be located with stakes according to the plan. Shrubs, vines, and ground cover shall be positioned on prepared bed areas as shown on the Drawings in their original containers. After quantity, staking, and spacing has been adjusted, if necessary, and approved by the Owner, plant where located.
 4. Obstructions or Unsuitable Conditions Below Grade: Any rock over 3/4" diameter, concrete, or other underground obstruction or unsuitable planting soil shall be removed to the depth necessary to permit proper planting according to Plans and Specifications. If underground construction, utilities, unusually large rock, other serious obstructions or unsuitable soil conditions are encountered in planting areas, other locations for the planting may be selected by the Owner.
- B. Excavation for Planting:
1. For new construction projects or for projects with significant site renovations that result in compacted soil conditions at the planting areas, especially in and around buildings, parking lots, or other hardscape areas, the following steps shall be taken:
 - a. Reference Section 32 92 00 for excavation at sod and meadow areas.
 - b. For all areas to receive shrub and groundcover planting, excavate and remove compacted soil to a minimum depth of 12" below the anticipated finished grade of the landscape bed, accounting for the bed height above the adjacent hardscape and lawn areas as specified herein.
 - c. For tree pits:
 - 1) Compacted soil shall be excavated to the size and depth as listed herein. After excavation, a percolation test shall be performed at each tree pit to verify adequate drainage.
 - 2) Perform percolation test by digging a 12" diameter x 12" deep hole at the bottom of the tree pit. Fill the hole with water and allow the water to drain completely. Refill the hole completely with water, and document how long it takes for the water to drain completely.
 - 3) If it takes longer than 6 hours to fully drain, or it does not fully drain, the contractor shall install three (3) sump holes equally spaced around the bottom of the tree pit. Each sump hole shall be 6" diameter x 24" deep as measured from the bottom of the tree pit and filled with drainage gravel. The top of each sump hole shall be covered with a sheet of non-woven geotextile fabric to prevent soil migration.
 2. Tree and large shrub pits: Shall be circular in outline with vertical, scarified sides and conical bottoms. Mechanical digging of pits may be approved by the Landscape Architect. Tree pit diameter shall be at least three times the size of the root ball diameter. Pits for trees shall be of sufficient depth to allow a six-(6) inch layer of planting soil spread around the ball while resting on scarified subgrade pedestal when they are set to grade. Pits for shrubs and other plants shall be of sufficient depth to allow a six-(6) inch layer of planting soil under the ball when they are set to grade.

3. Planting Beds: All planting bed areas shall be stripped of any grass, weeds and debris prior to excavation. Excavate to a minimum depth of 3" if compacted or poor soils are not present.
 4. Special Conditions: Beneath Existing Tree Canopies: Soil preparation depths for bed and lawn areas shall be modified to accommodate tree roots. Coordinate work with Landscape Architect.
- C. Soil Preparation:
1. Shrub and groundcover beds:
 - a. After stripping grass or removing the compacted soil from the proposed bed area, the area shall be thoroughly roto-tilled to a depth of six (6) inches. Place the specified Planting Bed Mix into the area to a depth of six (6) inches and the bed area shall then be roto-tilled again.
 - b. Repeat this process in 6" lifts until the top of the landscape bed is approximately 9" above the adjacent lawn or paved area. Incorporate fertilizer as specified herein.
 - c. The total bed depth, excluding the initial roto-tilled depth, shall be a minimum of twelve (12) inches.
 - d. Treat bed areas with specified pre-emergent herbicide at the manufacturer's recommended rate.
 2. Tree and large shrub plantings:
 - a. After planting pit excavation, install the root-ball anchors as specified herein prior to setting the tree in the pit. Verify the anchors are securely installed into undisturbed soil.
 - b. Planting Bed Mix shall be installed after setting the plants as listed below.
- D. Setting Plants:
1. General: Plants, excepting ground cover plants, shall be set approximately 1-1/2 to 2 inches above existing grade so that after settlement they will bear the same relationship to the finished grade of the surrounding soil that they bore to the grade of the soil from which they were dug.
 2. Lay out plants at locations as indicated on plans or as directed by Landscape Architect. Stake locations of individual trees and shrubs for approval by Landscape Architect prior to planting.
 3. Trees and large shrubs: After pits have been dug as specified previously, set plants straight and plumb in pits and remove burlap from sides and tops of balls, but no burlap shall be pulled from underneath. Place specified Planting Bed Mix around the ball to two-thirds (2/3) the depth of the pit. Firmly hand tamp and compact carefully to avoid injury to roots and to fill voids. Add water and allow it to drain away, and fill the pit to finished grade with soil. After the ground settles, additional soil shall be filled in to the level of the finished grade.
 4. Plants in Beds: Carefully insert plants into prepared topsoil at slightly above finished grade. When plants are in place, rake the entire bed area smooth, water, and allow to drain away. After settlement, add soil as necessary to finished grade and water again.

5. Forming Saucers: After planting has been completed, form a "saucer" or "bowl" of soil around each plant. Bowl shall extend to the limits of the plant pit for trees and shrubs. No bowls are required in areas of bed preparation, and shrubs in lines may share a common bowl around their perimeter.
- E. Fertilizing of Planting:
 1. Rates: Use a complete fertilizer with contents as specified herein and apply at the manufacturer's recommended rates.
 2. Placement for trees: Place slow-release fertilizer uniformly around and within the diameter of the plant saucer and incorporate into the top 6" layer of planting soil.
 3. Placement for shrubs and groundcovers: Place fertilizer evenly throughout the bed area and incorporate into the top 6" layer of planting soil.
- F. Topdressing / Mulching: Upon completion of the planting of all areas, install the specified topdressing or mulch evenly, entirely covering the area around each plant to the specified depth. In case of bed areas, the area between the plants is to be so treated, regardless of plant spacing, and trees shall be mulched entirely covering the tree pit area within the saucer.

3.4 TREE STABILIZATION

- A. Install below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.
- B. Root-Ball Stabilization
 1. Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.
 2. Verify the root-ball anchors are installed prior to backfilling the tree pit.
 3. Wrap the anchoring straps around the top of the root-ball and tighten to secure.
- C. If the root-ball anchoring system is determined to be insufficient for the site conditions, including unstable soils, an alternative tree stabilization system shall be submitted to the Landscape Architect for approval.

3.5 TREE, SHRUB, AND VINE PRUNING

- A. Each tree shall be assessed for pruning by an experienced plantsman to preserve the natural shape and character of the tree upon acceptance by the Landscape Architect. Method of pruning shall follow the International Society of Arboriculture guidelines for "Pruning Young Trees". Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- B. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

- C. Pruning cuts shall be sharp and clean. Pruning cuts over 3/4" in diameter may be painted with an approved tree surgery paint or sealer, applied only for cosmetic reasons, at the direction of the Landscape Architect.

3.6 LANDSCAPE EDGING INSTALLATION

- A. General: Install landscape edging after major construction activities are complete to avoid damage.
- B. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced at 30 inches apart, driven below top elevation of edging, or at every stake pocket location in landscape edging (header) sections designed and manufactured to receive stakes. Stakes shall be located in solid undisturbed soil, or in soil set at 85% relative compaction. A minimum of at least two stakes shall be used to anchor any partial section of edging.
- C. Horizontal Alignment. Install straight sections true to the alignments as indicated, free of waves or bends, using strings as guides. Install curved sections true to the alignments as indicated, free of waves or bends, following marked alignments approved in the field by the Landscape Architect. The Landscape Architect shall be given the opportunity to review the layouts.
- D. Vertical Alignment. Top of edging shall follow the finished grade elevations as indicated on the Drawings. Face of edging shall be plumb.
- E. Corners: All corners shall be bent to achieve straight 90-degree angles. No radius corners shall be accepted. The inside face of the edging may be scored to assist with bending the edging. No corner splices shall be accepted unless they are fully welded and ground smooth after splicing. Pre-fabricated corner splice stakes shall not be accepted.
- F. Splices: If using pre-punched edging, splices shall be double staked at overlap joints and adjacent pieces shall be flush with one another. If flat bar stock is being used, butt joints shall be fully welded, ground smooth, and anchored.
- G. Edging damaged or bent during installation or subsequent construction activities shall be replaced at not cost to the Owner.

3.7 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
- B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical

controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.8 PESTICIDE & HERBICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.
- C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.9 CLEANUP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.10 DISPOSAL

- A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 32 93 00

SECTION 33 1000
WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Scope: The work to be done under this section of the specifications includes all labor, materials, equipment and services necessary to install the water distribution system as indicated on the drawings.
- B. Related Sections: The following sections contain requirements that relate to this section:
 - 1. Division 31 Section "Earthwork" for excavation and backfill required for water system piping and structures.
 - 2. Division 03 Section "Cast-in-Place Concrete" for cast-in-place concrete.
- C. Submittals:
 - 1. General: Submit all product data required by and in conformance with the "Submittals" section of these specifications.
 - a. Submit data on all products and components specified herein.
- D. Quality Assurance:
 - 1. General: Comply with all requirements and standards of the New Orleans Sewerage and Water Board (S&WB).
 - 2. Environmental Compliance: Comply with applicable portions of local environmental agency regulations pertaining to water systems.
- E. Project Conditions:
 - 1. Site Information: Verify existing utility locations. Verify that water system piping may be installed in compliance with design and referenced standards.
 - a. Locate existing water main system piping and structures that are to be maintained.
- F. Sequencing and Scheduling:
 - 1. Coordinate with other utility work.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. All water mains, unless otherwise noted, shall be Class 150 Polyvinyl Chloride (PVC) pipe manufactured in accordance with AWWA C900, latest edition, and shall be U. L. listed. Pipe shall be furnished in standard lengths (min. 16 feet) with integral cast bells or couplings using elastomeric gaskets conforming with the C900 specification. Fittings shall be of cast iron conforming to ANSI A21.10 with rubber gasketed joints conforming to A21.11. Where fittings and valves with mechanical joints are used the bolts and nuts shall be stainless steel.

B. Concrete and Reinforcement:

1. Concrete: Strength at 28 days as shown on the Drawings.
 - a. Cement: ASTM C 150, Type I or II.
 - b. Fine Aggregate: ASTM C 33, sand.
 - c. Coarse Aggregate: ASTM C 33, crushed stone.
 - d. Water: Potable.
2. Reinforcement: Steel conforming to the following:
 - a. Fabric: ASTM A 185, welded wire fabric, plain.
 - b. Reinforcement Bars: ASTM A 615, Grade 60, deformed.

2.2 RELATED MATERIALS

- A. Insulated Enclosure: Heated Water Equipment Enclosures for backflow prevention, pump, and sprinkler assemblies: Hot Box, by Hubble Power Systems, or approved equal. Coordinate size of protected enclosure with corresponding exposed utility component.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The installation of the PVC pipe shall conform to the manufacturer's recommendations. The trench bottom shall be relatively smooth and free from roots, rocks, etc. The pipe shall be laid on a smooth bed of river sand six inches in depth for the full width of the trench and extending to the top of the pipe. The sand should be placed and consolidated under the pipe haunches to provide adequate side support to the pipe while avoiding displacement and misalignment. The remainder of the trench should be filled with pumped sand well compacted to the grade as required below.
- B. Offsets in water mains over or under drain lines shall be made by the Contractor with ductile iron fittings or ductile offset fittings. All ductile iron fittings shall be mechanical joint with retainer glands. All ductile iron pipe shall be wrapped with 8 mil. polyethylene wrap. Where off-sets are made over the drain, there shall not be less than 3.5 feet of cover over the offset piping. Before the backfilling of trench, the offsets shall be subjected to an in service visual inspection in the presence of the Architect.

3.2 BACKFILL

- A. Backfill material shall be select fill and shall be placed at or near optimum moisture content and compacted according to Section 312001 – Earthwork for Civil Construction.
- B. The above backfill material and compaction procedure shall be applied also for any service connections, offsets, etc.
- C. Backfill and compaction procedures shall comply with all requirements of the local governing agency having jurisdiction and per the Contract Documents.

END OF SECTION 33 10 00

SECTION 33 3000
SANITARY SEWERAGE

PART 1 - GENERAL

1.01 SUMMARY

- A. Extent of exterior sanitary sewer system as shown on the drawings.
- B. Refer to Division - 31 Section "EARTHWORK" for excavation and backfill required for exterior sanitary sewer system.
- C. Refer to Division 03 Section for concrete work required for sanitary sewer systems.

1.02 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of sanitary sewer system's products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Plumbing Code Compliance: Comply with applicable portions of National Standard Plumbing Code pertaining to selection and installation of sanitary sewer system's materials and products, and the regulations and standards of the New Orleans Sewerage and Water Board (S&WB).
- C. Environmental Compliance: Comply with applicable portions of local Environmental Agency regulations pertaining to sanitary sewer systems.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for sanitary sewer system materials and products.
- B. Record Drawings: At project closeout, submit record drawings of installed sanitary sewer system piping and products, in accordance with requirements of Division 1.

1.04 SYSTEM DESCRIPTION

- A. Sanitary Sewer Gravity Pipeline: Provide mains and laterals of polyvinyl chloride (PVC) plastic pipe.

1.05 DELIVERY AND STORAGE

- A. Piping: Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.
- B. Metal Items: Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.

- C. Cement, Aggregate, and Reinforcement: As specified in Division 3 section.
- D. Handling: Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Carry, do not drag, pipe to trench.

PART 2 - PRODUCTS

2.01 PIPELINE MATERIALS

- A. PVC Plastic Gravity Pipe and Fittings outside of the property line: For piping and fittings outside of the private property line, SDR-26 ASTM D3034, with ends suitable for elastomeric gasket joints.
- B. PVC Plastic Gravity Pipe and Fittings inside of the property line: All sanitary sewer pipes and fittings installed inside private property shall be in accordance with the Sewerage and Water Board of New Orleans Plumbing Department, Plumbing Code Section 10.2.3.
- C. PVC Plastic Gravity Joints and Jointing Material: Joints shall conform to ASTM D3212. Gaskets shall conform to ASTM F477.
- D. Gravity Pipe, Joints and Fittings located within the private property line: All components shall conform to the S&WB Plumbing Code.

2.02 MISCELLANEOUS MATERIALS

- A. Gaskets and Connectors at Manholes: Gaskets for joints between manhole sections shall conform to ASTM C443. Resilient connectors for making joints between manhole and pipes entering manhole shall conform to ASTM C923.

2.03 METAL ITEMS

- A. Frames, Covers and Gratings for Manholes: FSRR-F-621, cast iron.
- B. Manhole Steps: Zinc-coated steel conforming to ANSI A14.3. As an option, plastic or rubber coating pressure-molded to the steel may be used. Plastic coating shall conform to ASTM D4101, copolymer polypropylene. Rubber shall conform to ASTM C443, except shore A durometer hardness shall be 70 plus or minus 5. Aluminum steps or rungs will not be permitted. Steps are not required in manholes less than 4 feet deep.

PART 3 - EXECUTION

3.01 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

- A. General Requirements for Installation of Pipeline: Apply except where specific exception is made in the following paragraphs entitled, "Special Requirements."
- B. Location: The work covered by this section shall terminate at a point approximately 5 feet from the building, unless otherwise indicated. Where the location of the sewer is not clearly defined by dimensions on the drawings, do not lay sewer line closer horizontally than 10 feet to a water line.
- C. Earthwork: Perform earthwork operations in accordance with Section 312001, "EARTHWORK FOR CIVIL CONSTRUCTION" and as indicated on the drawings.
- D. Pipe Laying and Jointing: Inspect each pipe and fitting before and after installation; replace those

found defective and remove from site. Provide proper facilities for lowering sections of pipe into trenches. Lay pipe with the bell ends in the upgrade direction. Adjust spigots in bells and tongues in grooves to give a uniform space all around. Blocking or wedging between bells and spigots will not be permitted. Replace by one of the proper dimensions, pipe or fittings that do not allow sufficient space for installation of joint material. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Provide batterboards not more than 25 feet apart in trenches for checking and ensuring that pipe invert elevations are as indicated. Laser beam method may be used in lieu of batterboards for the same purpose.

- E. Connections to Existing Lines: Obtain approval from the local governing utility agency having jurisdiction before making connection to existing line. Conduct work so that there is minimum interruption of service on existing line.
- F. Special Requirements:
 - 1. Installation of PVC Plastic Piping: Install pipe and fittings in accordance with paragraph entitled, "General Requirements for Installation of Pipelines" of this section and with the requirements of UNI B5 for laying and joining pipe and fittings. Make joints with the gaskets specified for joints with this piping and assemble in accordance with the requirements of UniBell Plastic Pipe Association (UNI) B5 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.
 - 2. Cleanouts: Construct cleanouts of cast iron soil pipe and fittings.
 - 3. Concrete Work: Cast-in-place concrete is included in Division 3 Section.
 - 4. Manhole Construction: Construct base slab of cast-in-place concrete. Make inverts in cast-in-place concrete bases with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent sewer sections. For changes in direction of the sewer and entering branches into the manhole, make a circular curve in the manhole invert of as large a radius as manhole size will permit. Construct manholes in accordance with drawings. Make joints between concrete manholes and pipes entering manholes with the resilient connectors specified for this purpose; install in accordance with the recommendations of the connector manufacturer. Where a new manhole is constructed on an existing line, remove existing pipe as necessary to construct the manhole. Cut existing pipe so that pipe end are approximately flush with the interior face of manhole wall, but not protruding into the manhole. Use resilient connectors as previously specified for pipe connectors to manholes.

3.02 MISCELLANEOUS CONSTRUCTION AND INSTALLATION

A. Metal Work

- 1. Workmanship and Finish: Perform metal work so that workmanship and finish will be equal to the best practice in modern structural shops and foundries. Form iron to shape and size with sharp lines and angles. Do shearing and punching so that clean true lines and surfaces are produced. Make castings sound and free from warp, cold shuts, and blow holes that may impair their strength or appearance. Give exposed surfaces a smooth finish with sharp well-defined lines and arises.
- 2. Provide necessary rabbets, lugs, and brackets wherever necessary for fitting and support.

3.03 FIELD QUALITY CONTROL

- A. Field Test and Inspections: The Contractor shall perform field tests and provide labor, equipment, and incidentals required for testing. Be able to produce evidence, when required, that each item of work has been constructed in accordance with the drawings and specifications.
- B. All tests and inspections must meet the requirements of the local governing authority having jurisdiction, and the Contract Documents.
- C. Inspection: Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line.
- D. Leakage Test: Test lines for leakage by either infiltration tests or exfiltration tests, or by low-pressure air tests. Prior to testing for leakage, backfill trench up to at least lower half of pipe. When necessary to prevent pipeline movement during testing, place additional backfill around pipe sufficient to prevent movement, but leaving joints uncovered to permit inspection. When leakage or pressure drop exceeds the allowable amount specified, make satisfactory correction and retest pipeline section in the same manner. Correct visible leaks regardless of leakage test results.
- E. Infiltration Tests and Exfiltration Tests: Perform these tests for sewer lines made of the specified materials, not only concrete, in accordance with ASTM C969. Make calculations in accordance with the Appendix to ASTM C969.
- F. Low-Pressure Air Tests: Test in accordance with UNI B6. Allowable pressure drop shall be as given in UNI B6. Make calculations in accordance with the Appendix to UNI B67.
- G. Deflection Testing: Perform a deflection test on entire length of installed plastic pipeline on completion of work adjacent to and over the pipeline, including leakage tests, backfilling, placement of fill, grading, paving, concreting, and any other superimposed loads determined in accordance with ASTM D2412. Deflection of pipe in the installed pipeline under external loads shall not exceed 4.5 percent of the average inside diameter of pipe. Determine whether the allowable deflection has been exceeded by use of a pull-through device or a deflection measuring device.
- H. Pull-through Device: This device shall be a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. Circular sections shall be so spaced on the shaft that distance from external faces of front and back sections will equal or exceed diameter of the circular section. Pull-through device may also be of a design promulgated by the Uni-Bell Plastic Pipe Association, provided the device meets the applicable requirements specified in this paragraph, including those for diameter of the device, and that the mandrel has a minimum of 9 arms. Ball, cylinder, or circular sections shall conform to the following:
 - 1. A diameter, or minor diameter as applicable, of 95 percent of the average inside diameter of the pipe; tolerance of plus 0.5 percent will be permitted.
 - 2. Homogeneous material throughout, shall have a density greater than 1.0 as related to water at 39.2 degrees F, and shall have a surface Brinell hardness of not less than 150.
 - 3. Center bored and through-bolted with a 1/4 inch minimum diameter steel shaft having a yield strength of not less than 70,000 pounds per square inch, with eyes or loops at each end for attaching pulling cables.
 - 4. Each eye or loop shall be suitably backed with a flange or heavy washer such that a pull exerted on opposite end of shaft will produce compression throughout remote end.
- I. Deflection Measuring Device: Sensitive to 1.0 percent of the diameter of the pipe being tested and shall be accurate to 1.0 percent of the indicated dimension. Deflection measuring device shall be approved prior to use.

- J. Pull-through Device Procedure: Pass the pull-through device through each run of pipe, either by pulling it through or flushing it through with water. If the device fails to pass freely through a pipe run, replace pipe which has the excessive deflection and completely retest in same manner and under same conditions.
- K. Deflection Measuring Device Procedure: Measure deflections through each run of installed pipe. If deflection readings in excess of 4.5 percent of average inside diameter of pipe are obtained, retest pipe by a run from the opposite direction. If retest continues to show a deflection in excess of 4.5 percent of average inside diameter of pipe, replace pipe which has excessive deflection and completely retest in same manner and under same conditions.
- L. Field Tests for Concrete: Field testing requirements are covered in Division 03 section.

END OF SECTION 33 30 00