

PROVIDENCE CITY HALL EXTERIOR RESTORATION, PHASE I

25 Dorrance Street, Providence, RI 02903

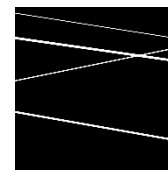
Project Manual Issued for Bid

March 11, 2026

Project No. 2417

Owner:
City of Providence
25 Dorrance Street
Providence, RI 02903

Architect:



DBVW
ARCHITECTS

111 CHESTNUT ST
PROVIDENCE, RI 02903

T 401 831 1240
F 401 331 1945

www.dbvw.com

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DBVW Architects, Inc.
Project No. 2417
Issued for Bid

Providence City Hall Exterior Restoration, Phase I
Providence, Rhode Island
March 11, 2026

SECTION 000001 - CONTACTS

Owner

City of Providence
25 Dorrance Street
Providence, RI 02903
401-680-5329
Contact Person: Daniel Kittridge
Email: dkittridge@providenceri.gov

Architect

DBVW Architects, Inc.
111 Chestnut Street
Providence, RI 02903
401-831-1240
Contact Person: Benjamin Lueck
Email: blueck@dbvw.com

Structural Engineer

RSE Associates
63 Pleasant Street, Suite 300
Watertown, MA 02472
617-926-9300
Contact Person: Jennifer McClain
Email: jennifer.mcclain@rseassociates.com

END OF SECTION 000001

SECTION 000002 - LIST OF DRAWINGS

The Drawings for this Project represent an integral part of the Contract Documents and should not be considered as a separate entity. These Drawings, together with the Project Manual, which contain the technical specifications, form a complete process of disseminating information required to perform the Work of this Project. The following list indicates the Drawings for this Project. The Drawings are listed in respective order for convenience only, not to suggest a specific sequence for performing the work. The Work indicated on an individual drawing is not to be construed as specific work for a specific trade, Filed Sub Bidder, subcontractor, or supplier.

A000 COVER SHEET

GENERAL

A001 NOTES, KEYNOTES, SYMBOLS & ABBREVIATIONS

A002 PHASE I SITE PLAN LIMIT OF ROOF WORK

ARCHITECTURAL

AD203 ROOF DEMOLITION PLAN

AD300 DEMOLITION ELEVATIONS

AD301 DEMOLITION ELEVATIONS

A200 ROOF PLAN

A300 EXTERIOR ELEVATIONS ROOF EXTENTS

A301 EXTERIOR ELEVATIONS DECORATIVE METAL EXTENTS

A302 EXTERIOR ELEVATIONS MASONRY EXTENTS

A303 EXTERIOR ELEVATIONS

A304 EXTERIOR ELEVATIONS

A305 EXTERIOR ELEVATION

A500 EXTERIOR DETAILS

A501 EXTERIOR DETAILS

A502 EXTERIOR DETAILS

A503 EXTERIOR DETAILS

A504 EXTERIOR DETAILS

A505 EXTERIOR DETAILS

END OF SECTION 000002

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Work under Owner's separate contracts.
 - 4. Contractor's use of site and premises.
 - 5. Coordination with occupants.
 - 6. Work restrictions.
 - 7. Specification and Drawing conventions.
 - 8. Miscellaneous provisions.
- B. Related Requirements:
 - 1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
 - 2. Division 01 Section "Execution."

1.3 DEFINITIONS

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

1.4 PROJECT INFORMATION

- A. Project Identification: Providence City Hall Exterior Restoration, Phase I
 - 1. Project Location: 25 Dorrance Street, Providence, RI 02903
- B. Refer to Division 01 Section "Contacts" for information pertaining to Owner, Owner's Project Manager, Owner's Other Consultants, Architect, and Architect's Consultants.
- C. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.
 - 1. See Division 01 Section "Project Management and Coordination." for requirements for using web-based Project software.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents.

- B. The work includes, but is not necessarily limited to, the following scope on the dome and the northeast and southeast pavilions. Refer to the Drawings for the areas included in the Project. Refer to Section 012300 – “Alternates” for areas included in base scope and alternate scope.
1. Removal of existing slate shingle roofing on the four sides of the dome and the mansard roofs of the northeast and southeast pavilions. Removal includes all associated sheet underlayments and flashings, down to the existing roof deck, consisting of cementitious coating over structural clay tile.
 2. Removal of existing low-slope roofing, including single-ply membranes and sheet metal, on the upper dome roof and the northeast and southeast pavilion roofs. Removal includes all associated substrate panels, sheet underlayments, and flashings, down to the existing roof deck, consisting of cementitious coating over structural clay tile.
 3. Removal of all sheet metal flashings, gutter linings, and decorative cladding in designated areas of dome and pavilion roofs.
 4. Removal of existing coatings and other materials from surfaces of cast iron components integrated into the roofing assemblies. Cleaning and repair of the cast iron, including removal of surface corrosion. Preparation of cast iron for application of fluid-applied waterproofing (at areas that will be clad with new decorative copper) or high-performance coatings (at areas that will remain exposed).
 5. Preparation of masonry surfaces at areas that will be clad with new decorative copper, for application of fluid-applied vapor permeable air-vapor barrier.
 6. Installation of new plywood panel sheathing, mechanically anchored to the existing clay tile roof deck, at all areas of roofing replacement.
 7. Installation of new slate roofing to match the existing shingle size, shape, and pattern, at the dome and east pavilion mansard roofs, including associated substrate materials and flashings.
 8. Installation of new single-ply membrane roofing, including associated substrate materials and flashings, at the designated pavilion roofs.
 9. Installation of new reinforced fluid-applied roofing system at the upper dome roof, including associated substrate materials and flashings.
 10. Replacement of all sheet metal flashings and gutter linings at all areas of roofing replacement. Installation of new sheet metal step flashing where slate roofing intersects rising masonry walls.
 11. Sequencing and detailing of all transitions between waterproofing, air-vapor barrier, fluid-applied roofing, membrane roofing, and slate roofing systems to provide full continuity of weather barriers at entire area of Project.
 12. Installation of new decorative copper cladding over existing cast iron and other areas of existing decorative cladding at entire area of Project, unless otherwise noted on the Drawings.
 - a. At dome parapet, dome hips, areas of existing cladding at base of dome: Replicate profiles and details of existing cladding at these areas.
 - b. At pavilion cornices and hips: Replicate the profiles and details of the existing cladding at west pavilion cornices and hips.
 - c. At areas of exposed cast iron at base of dome: Develop profiles and details to match the surface of the cast iron to be clad with new copper sheet metal.
 13. Cleaning, repair, and preparation of all existing metal work at the base of the dome flagpole. Application of fluid-applied waterproofing or high-performance coating as indicated on the Drawings.
 14. Removal and replacement of roof accessories as indicated on the Drawings.
 15. Removal and replacement of existing sheet metal downspouts and splash blocks at the base of the dome.
 16. Repair, restoration, and coating of wood windows at the dome walls and within the dome roof.
 17. Repair, repointing, and cleaning of stone masonry at the upper portion of the center

- pavilion, as indicated on the Drawings.
18. Replacement of all perimeter sealant at windows in the dome walls and the upper floor of the center pavilion, as indicated on the Drawings.
 19. Patch repairs of existing single-ply roofing membrane at isolated areas of main roof and west pavilion roofs outside the areas of roofing replacement, to be identified by Architect. Assume 20 locations of 6 inch by 6 inch patch repairs.
 20. Water-jetting and video scoping of all roof drains connected to internal plumbing, including the main roof and west pavilions, as indicated on the Drawings.

1.6 TYPE OF CONTRACT

- A. The Project will be constructed under a single prime contract for General Construction with the necessary subcontractors and filed sub-bid contractors as part of the Base Bid.
- B. The Work will be executed in one phase, as sequenced by the General Contractor.
 1. The existing building and site areas will remain occupied during construction.
 2. Work inside and outside the areas indicated on the Drawings must be coordinated with the Owner and executed to ensure continued daily operations of adjacent occupied buildings and sites.
 3. Refer to the Drawings for additional information.
 4. The Contractor shall provide a detailed construction schedule, showing the sequence, commencement and completion dates, to be submitted to the Owner and Architect for review and approval in accordance with Division 01 Section "Construction Progress Documentation."
- C. All costs associated with performance of the Work at premium rates will be borne by the General Contractor.

1.7 WORK PERFORMED BY OWNER

- A. 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.
- B. Concurrent Work: Owner may perform concurrent construction operations at Project site. Contractor shall coordinate with Owner as needed to ensure all concurrent work can proceed without delay or interference.

1.8 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Limited Use of Existing Building/Site: Contractor shall have limited use of the existing building and the Project site for construction operations during the construction period. Contractor's use of Project site is limited only by Owner's right to continue daily operations in the occupied portions of the buildings and/or sites, perform work, or to retain other contractors on portions of Project. Unless otherwise indicated, public ways and access to occupied areas must always be kept open.
- B. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- C. Limit use of premises to work in areas so as not to disturb portions of Project site beyond areas

in which the Work is indicated, on neighboring properties and public ways. Contractor's use of the Project site will be limited to the area shown on the Drawings. Do not disturb portions of Project site beyond areas in which Work is indicated, unless approved by Owner.

1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways, roadways, and entrances. Large deliveries such as steel, concrete, etc. shall be scheduled to avoid Owner's operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - c. Do not close or obstruct walkways or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 2. Coordinate extent of access, egress, construction activities and disruptions in the buildings and on the site with the Owner prior to commencing any work.
 3. Confine the parking of workmen's and construction vehicles, and the storage of construction materials to designated staging areas as coordinated and determined by the Owner.
 4. Maintain access to existing exits, corridors, and other adjacent occupied or used facilities. Do not close or obstruct exits, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
- D. Condition of Existing Building: Maintain existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building during the construction period.
- E. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations, and to areas which are existing to remain and/or outside the work limits.
- F. Security: Continuously maintain the security of the buildings, project the sites and the Work. Coordinate with the Owner in particularly sensitive areas where special provisions are required. Ensure all gates, windows, doors, and other openings are secured at the end of each workday.
- 1.9 COORDINATION WITH OCCUPANTS
- A. Full Owner Occupancy: Owner will occupy Project site during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction. Means of egress shall be maintained in a safe and accessible condition at all times. All sidewalks shall be maintained in a safe and accessible condition at all times.
 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.10 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of Owner, OPM, and authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
 - 1. Comply with local and state regulations regarding work hours, noise and/or dust producing work, etc.
 - 2. Weekend Hours: Only if approved by Owner and authorities having jurisdiction.
 - 3. Early Morning Hours: Only if approved by Owner and authorities having jurisdiction. This includes deliveries, start-up and idling of construction equipment and vehicles, and other noisy operations.
 - 4. Hours for Utility Shutdowns: To be coordinated and scheduled with Owner.
 - 5. Do not perform work resulting in noisy activity on-site during work black-out days.
 - 6. The General Contractor is fully responsible for obtaining and paying all permits fees to work on weekends and holidays as may be required by local or state authorities and any fees associated with work outside the ordinances for weekday work.
 - 7. Work required and/or directed outside normal hours and conditions prescribed above to meet the scheduled project deadlines are to be included in the Base Bid.
- C. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner or neighbors.
 - 1. Notify Owner not less than two (2) working days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
 - 3. Submit dust, noise, vibration, and odor control plan for Architect and Owner review prior to commencing onsite work.
- D. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions, and then only after providing temporary utility services according to requirements indicated. Utilities include but are not limited to the following: electrical power, data, communications, fire alarm, water, and sewer/septic.
 - 1. Notify Architect and Owner at least seven (7) calendar days in advance.
 - 2. Obtain Architect's and Owner's written permission before proceeding.
 - 3. The Owner reserves the right to reject and/or request modification to these interruptions and shut down requests, if it is determined that the request cannot be carried out in a manner that protects the interest of the Owner. In the event the request is rejected and/or otherwise modified, the Contractor shall not be compensated for additional costs and/ or provided additional time for the Project.
 - 4. Provide appropriate fire watch during shutdowns which may affect fire alarm and/or sprinklers system operations.
 - 5. Duration of shutdowns and interruptions shall be kept to a minimum.
 - 6. All systems shall be returned to normal operating conditions at end of the workday, unless otherwise planned and provided for and approved by the Owner in writing.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco or marijuana products, smoking, vaping, juuling, alcoholic beverages, and other controlled substances on Project site is not permitted.

- F. Employee Identification and Screening: Comply with Owner's requirements.

1.11 CODES, STANDARDS AND PERMITS

- A. The Contractor is responsible to obtain and pay for all required local and state permits.
1. Include permits, signoffs, and approvals for all major equipment and systems.
- B. Comply with all laws and standards in effect as of the date of receipt of Bids which are applicable to this Project. All work shall further conform to specific requirements and interpretations of local authorities having jurisdiction over the Project.
- C. Refer to the Code Plan Drawings for the codes used in the design of the project.
- D. Code Enforcement and Approvals: The Contractor shall secure the general building permit and any other necessary permits or approvals for the work.
1. Upon receipt of the permit, promptly distribute copies thereof to Owner and Architect.
 2. Display all permit cards as required by the authorities and deliver legible photocopies of all permits to Owner and Architect promptly upon their receipt.
 3. Arrange for all inspections, testing and approvals required for all permits. Notify the Owner and Architect at least three (3) business days in advance.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's "Master Format" numbering system. The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on

- Drawings and published as part of the U.S. National CAD Standard.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.
- E. Coordination: In general, the Specifications will describe the “quality” of the work and the Drawings, the “extent” of the work. The Drawings and Specifications are cooperative and complementary, and each item of the work is not necessarily mentioned in both the Drawings and the Specifications. All work necessary to complete the project, so described, is to be included in this Contract.
- F. In case of disagreement between Drawings and Specifications, or within either document itself, the Architect shall construe the Documents to require the better quality or greater quantity of work for the Owner that can reasonably be construed there from. Any work done by the Contractor without consulting the Architect, when the same requires a decision, shall be done at the Contractor's risk.
- 1.13 SOCIAL SECURITY TAXES AND UNEMPLOYMENT INSURANCE
- A. The General Contractor and each Subcontractor shall pay the taxes and unemployment insurance measured by the wages of all their employees as required by law and accept the exclusive liability for said contributions. The Contractor shall also indemnify and hold the Owner, and its respective officers, agents, and servants; Owner's Project Manager, and the Architect harmless on account of any expense measured by the wages aforesaid of employees of the Contractor and Subcontractors, assessed against the Owner under authority of said law.
- B. Comply with the laws of the State in which the project is located relating to taxes, reporting of employees and contractors, and withholding and remitting child support.
- 1.14 UNEMPLOYMENT INSURANCE
- A. The General Contractor and each Subcontractor shall pay unemployment insurance measured by the wages of his employees as required by law and accept the exclusive liability for said contributions. The Contractor shall also indemnify and hold harmless the Owner's Project Manager, Owner, and the Architect on account of any contribution measured by the wages of aforesaid employees of the Contractor and his Subcontractors, assessed against the Owner under authority of law.
- 1.15 OCCUPATIONAL SAFETY AND HEALTH ACT
- A. The General Contractor and each Subcontractor shall comply with the requirements of the Occupational Safety and Health Act and the Construction Safety Act, including all standards and regulations which have been promulgated by the Governmental Authorities which administer such Acts and said requirements, standards and regulations are incorporated herein by reference.
1. Comply with the General Law in the State in which the Project is located which requires that everyone employed at the job site complete a course in construction safety and health approved by the US OSHA, known as the “OSHA-10 Hour Course.”
- B. The General Contractor shall require and be directly responsible for compliance of the above on the part of its agents, employees, suppliers, Subcontractors and shall directly receive and be responsible for all citations, assessments, fines, or penalties which may be incurred by reason of its agents, employees, suppliers, or Subcontractors failing to so comply.

- C. The General Contractor shall indemnify the Owner's Project Manager, Owner and its representatives, officers, agents, and Architect and save them harmless from any and all losses, costs, and expenses, including fines and reasonable attorney's fees incurred by the Owner and Architect by reason of the real or alleged violation of such laws. Ordinances, regulations, and directives, Federal, State, and Local, which are currently in effect, or which become effective in the future, by the Contractor, his Subcontractors or material men.
- D. The General Contractor shall manage to the process to ensure all workers submit a copy of their OSHA-10 course completion to the Owner and OPM prior to mobilization to the project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

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

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other Work of the Contract.
- D. Schedule: Refer to Part 3 "Schedule of Alternates" Article at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Northeast Pavilion.

1. Base Bid:

- a. All scope, as indicated in the Drawings and Project Manual, at the dome and center pavilion. Refer to the Drawings for extents of area included in Base Bid.
- b. All patch repairs of existing single-ply roofing membrane at isolated areas of existing main roof and existing pavilion roofs to remain, to be identified by architect (assume 20 locations of 6 inch by 6 inch patch repairs). Refer to Sheet A201.
- c. Jetting and scoping of all existing roof drains and interior leaders, including pavilions. Refer to Sheet A201.

2. Add Alternate:

- a. In addition to Base Bid, include all scope, as indicated in the Drawings and Project Manual, at the northeast pavilion. Refer to the Drawings for extents of area included in Alternate No. 1.

B. Alternate No. 2: Southeast Pavilion.

1. Base Bid:

- a. All scope, as indicated in the Drawings and Project Manual, at the dome and center pavilion. Refer to the Drawings for extents of area included in Base Bid.
- b. All patch repairs of existing single-ply roofing membrane at isolated areas of existing main roof and existing pavilion roofs to remain, to be identified by architect (assume 20 locations of 6 inch by 6 inch patch repairs). Refer to Sheet A201.
- c. Jetting and scoping of all existing roof drains and interior leaders, including pavilions. Refer to Sheet A201.

2. Add Alternate:

- a. In addition to Base Bid and Alternate No. 1, include all scope, as indicated in the Drawings and Project Manual, at the southeast pavilion. Refer to the Drawings for extents of area included in Alternate No. 2.

END OF SECTION 012300

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Division 01 Section "Unit Prices for administrative requirements for using unit prices.
 - 2. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on ASI Form included at the end of Part 3 in this Section.
 - 1. Form, including attachments, will be issued electronically as a PDF.

1.4 REQUEST FOR INFORMATION

- A. Contractor will request information regarding the Work, on form acceptable to the Architect.
 - 1. RFI forms shall be submitted in a typewritten, standardized format, including title and description, and sequentially numbered.
 - 2. Submit RFI, including attachments, electronically as a "portable document file" (PDF), using the web-based project management software. (Fax and hardcopy submittals are not acceptable.)
 - 3. RFI forms are not to be submitted as requests for shop drawing approval. Comply with requirements in Division 01 Section "Submittal Procedures."
 - 4. Architect will issue a response to Contractor's RFI. Form, including attachments, will be issued electronically as a PDF.

1.5 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. "Proposal Requests" will be issued via Proposal Request Form included at the end of Part 3. Form, including attachments, and will be issued electronically as a PDF.

3. Within time specified in Proposal Request or within fourteen (14) calendar days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include costs of labor and supervision directly attributable to the change.
 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
 7. Proposal Request Form: Use form acceptable to Architect.

1.6 CHANGE ORDER PROPOSALS

- A. Hourly Rates: At the start of the project, submitted no later than the first pencil requisition, provide a detailed breakdown of the total hourly cost for each journeyman, supervisor, foreman, and apprentice of the Contractor and each Subcontractor.
 1. Provide a detailed breakdown of wages, fringe benefits, payroll taxes, and insurance.
 2. Provide hourly cost for straight time, time, and one-half, and double time. Hourly cost may not include overhead or profit.
 3. If the combined total of payroll taxes and insurance exceeds thirty percent (30%) of the wages, provide a notarized letter from the insurance agent or underwriter stating the percentage of payroll for each type of insurance for each construction trade classification. The cost of payroll taxes and insurance that are a function of payroll are allowed only on compensation that is paid in the form of wages and is not allowed on compensation that is paid in the form of fringe benefits.
- B. Change Order Proposal Form: Use AIA Document G709, or similar document.
 1. Submit proposals, including attachments, electronically as a PDF.

2. Each Change Order Proposal is to include reference to the initiating document, a title and description, and be sequentially numbered.
3. Include all costs and time extensions requests for each item or claim. Change proposals must be complete; to determine a fair and reasonable resolution of said item or claim.
4. Following review of a Change Order Proposal (COP) by the Architect, if corrections are required prior to inclusion in a Change Order, resubmit revised COP with revision number and include all backup documentation.

C. Change Order Proposal Mark-Ups: Refer to the Contract for Construction.

1. If the net change is an Add to the Contract Price, it shall include the Contractor's overhead, superintendence, and profit. On any change that involves a net Deduct to the Contract Price, no allowance for overhead, superintendence and profits shall be included.
2. Charges for small tools known as "tools of the trade" are not to be computed in the amount of any change to the Contract Price.

1.7 CHANGE ORDER PROCEDURES

- A. Upon Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.
- B. Change Orders are considered as final resolution items contained therein relative to Contract Sum and Time. No additional claims are allowed after execution of a Change Order.

1.8 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time. Adjustment methods utilized include but are not necessarily limited to lump sum, unit cost, and time and material.
 2. A Construction Change Directive shall be used in the absence of a total agreement on the terms of a Change Order Proposal and/or Change Order. Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work.
 3. The Contractor shall advise the Architect in writing, not more than fourteen (14) calendar days after receipt of Construction Change Directive, of the Contractor's agreement or disagreement with the method of determining the adjustment to the Contract Sum or the Contract Time provided in the Construction Change Directive.
 4. If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by the Architect on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, a reasonable allowance for overhead and profit. In such case, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive. Notify onsite OPM when work is starting and finishing for each day. Submit daily slip to onsite OPM for verification of labor hours, materials and equipment used for the additional work. Additional work shall not be interrupted by performing base

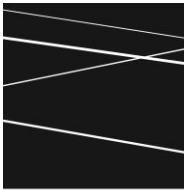
contract work. Failure to provide a slip for verification on the day work is performed may result in denial of additional cost.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
- C. The Architect will prepare a Change Order upon approval by the Architect and Owner of a Change Order Proposal.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600



DBVW
ARCHITECTS

111 CHESTNUT STREET
PROVIDENCE, RI 02903

T 401 831 1240
F 401 331 1945

www.durkeebrown.com

ARCHITECT'S SUPPLEMENTAL INSTRUCTIONS

2417_012600_2_ASI.doc

Date: _____

Number: _____

PROJECT:

OWNER:

CONTRACTOR:

FROM:

TO:

RE:

CC:

DESCRIPTION / ATTACHMENTS

- ☐ **Architect's Supplemental Instruction** – The work shall be carried out in accordance with this instruction except that if, in the Contractor's opinion, this instruction involves work which will require a change in Contract Sum or Time, the Contractor shall not proceed until he has submitted a Change Estimate and received further instructions.

Reference _____



111 CHESTNUT STREET
PROVIDENCE, RI 02903

T 401 831 1240
F 401 331 1945

www.durkeebrown.com

PROPOSAL REQUEST

DBVW
ARCHITECTS

Date: _____

PR- _____

PROJECT:

OWNER:

CONTRACTOR:

DESCRIPTION/ATTACHMENTS

The Contractor is requested to prepare a Change Estimate for the Owner's consideration. This is not an authorization to proceed with the work described.

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment. Comply with other requirements, if any, of Owner.
- B. Related Requirements:
 - 1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
 - 3. Division 01 Section "Submittal Procedures" for administrative requirements governing the preparation and submittal of the submittal schedule.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Construction Schedule.
 - d. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date, but no later than thirty (30) calendar days before the date scheduled for submittal of initial Applications for Payment. Submit electronically as a PDF.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section. For major trades with line-item values exceeding \$100,000, provide separate line items for identifiable units of work within such trade with a value not exceeding \$50,000. Provide separate line items for labor and material. Additional breakdown or identification of work by building, floor, and area

may also be necessary.

1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Owner's name.
 - c. Owner's Project number.
 - d. Name of Architect.
 - e. Architect's Project number.
 - f. Contractor's name and address.
 - g. Date of submittal.
2. Arrange schedule of values consistent with format of AIA Document G702 & G703.
3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide separate line items for labor and material in each category of work. Coordinate with the Project Manual Table of Contents. Provide multiple line items for principal subcontract amounts in excess of five percent (5%) of the Contract Sum.
5. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training. Include the following mandatory line items:
 - a. Mobilization and Demobilization.
 - b. Insurance.
 - c. Bonds.
 - d. Project sign.
 - e. Coordination drawings.
 - f. Shop drawings and submittals.
 - g. Scheduling.
 - h. Field engineering.
 - i. Hoisting and Staging.
 - j. Daily Cleanup.
 - k. Final Cleaning.
 - l. Safety Program.
 - m. Traffic Control and Police Details.
 - n. Full-Time Project Superintendent and Project Management.
 - o. Field Offices.
 - p. Dumpsters.
 - q. Temporary Fencing.
 - r. Cold Weather Protection.
 - s. Temporary Heating and Cooling.
 - t. Temporary Dehumidification.

- u. Water and Sanitary Facilities.
 - v. Demonstration and Training.
 - w. Closeout.
 - x. General Contract O & P (not to be included in each line item).
 - 6. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 - 7. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
 - b. Provide evidence of insurance or bonded warehousing for off-site materials.
 - c. Off-site storage outside of the continental United States (lower 48) will not be authorized for payment, regardless of if a bond is provided.
 - 8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 - 9. Provide separate line items in the Schedule of Values for initial cost of labor and materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 - 10. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - 11. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 - 12. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements.
 - 13. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.
- C. Hourly Rates: Include with the Schedule of Values, a detailed breakdown of the total hourly cost for each journeyman, foreman, and apprentice of the Contractor and each Subcontractor.
- 1. Provide a detailed breakdown of wages, fringe benefits, payroll taxes, and insurance.
 - 2. Provide hourly cost for straight time, time, and one-half, and double time. Hourly cost may not include overhead or profit.
 - 3. If the combined total of payroll taxes and insurance exceeds thirty percent of the wages, provide a notarized letter from the insurance agent or underwriter stating the percentage of payroll for each type of insurance for each construction trade classification. The cost of payroll taxes and insurance that are a function of payroll are allowed only on compensation that is paid in the form of wages and is not allowed on compensation that is paid in the form of fringe benefits.
- 1.5 APPLICATIONS FOR PAYMENT
- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and paid for by Owner.
 - B. Payment Application Times: Submit Application for Payment to Architect and Owner by the fifteenth (15th) day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
 - 1. Contractor shall review with the Architect and Owner a preliminary draft of each Application for Payment before final copies of the Application are formally submitted. The draft copy shall be typed and include the application date and application number. It shall

- also include the total of each column and extension of each row on the Application as if this was the formal submission. The cover sheet shall include the Original Contract Sum and a summary of Changes to the Contract Sum, retainage, and payments to date as in the formal submission.
2. Submit draft copy of Application for Payment seven (7) days prior to due date for review by Architect and Owner. Submit electronically as a PDF.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - a. List each Change Order at the end of the Schedule of Values. Under each Change Order number, list each Change Order Proposal by number with a brief description of the Work and its value.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site. Only items stored within the continental United States (lower 48) will be considered for payment.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of additional materials stored with this Application.
 - d. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Deposits: Payments which function as deposits for items such as elevators and specialty equipment will not be entertained.
- G. Monthly Application for Payment: Submit electronically as a PDF to Architect.
1. Include a transmittal form listing attachments and recording appropriate information about the application for payment.
 2. When required by Owner, provide seven (7) signed and notarized original hardcopies.
 3. Include waivers of lien and similar attachments if required.
- H. Certified Payroll Records: Submit at the time of the Application for Payment directly to the Owner. Refer to Division 01 Section "Construction Progress Documentation" for specific

requirements.

1. The Architect and Owner may withhold a portion of the Application for Payment if payroll reports have not been submitted for a portion of the Work.
- I. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Approved schedule of values.
 3. Contractor's construction schedule.
 4. Schedule of unit prices.
 5. Schedule of accepted alternates.
 6. Submittal schedule.
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
- K. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing one hundred percent (100%) completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - a. Complete administrative actions, submittals, and Work preceding this application, as described in Division 01 Section "Closeout Procedures."
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- L. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Certification of completion of final punch list items.

3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
4. Updated final statement, accounting for final changes to the Contract Sum.
5. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
6. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
7. AIA Document G707, "Consent of Surety to Final Payment."
8. Evidence that claims have been settled.
9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.
11. Proof that taxes, fees, and similar obligations are paid.
12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Administrative and supervisory personnel.
 - 3. Coordination drawings.
 - 4. Requests for Information (RFIs).
 - 5. Digital project management procedures.
 - 6. Web-based Project management software package.
 - 7. Project meetings.
- B. The General Contractor and each subcontractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific subcontractor.
- C. Related Requirements:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

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

1.4 INFORMATIONAL SUBMITTALS

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

1.5 KEY PERSONNEL

- A. General: At a minimum, provide one (1) full-time Project Manager, one (1) full-time Project Superintendent, and one (1) full-time clerical staff. Provide other administrative and supervisory personnel as required for proper performance of the Work. Owner's approval is required for all key personnel.
 - 1. Project Superintendent shall have a minimum of ten (10) years of construction experience.
 - 2. Assistant Project Superintendent shall have a minimum of five (5) years of construction experience.
- B. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone 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.
- C. Key Personnel Names: Within seven (7) calendar days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 - 1. Post copies of list in project meeting room, in temporary field office, in web-based Project software directory, and by each temporary telephone. Keep list current at all times.

1.6 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. 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, electrical, plumbing and fire protection.
 - 5. No claim for extra compensation or extension of Contract time will be allowed for conditions resulting from a lack of said coordination.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled 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:
1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.7 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data.
 - b. Coordinate the addition of trade-specific information to coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, plumbing, fire protection, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Provide coordination drawings showing plans and elevations of mechanical, plumbing, fire protection, and electrical equipment.
 - a. If technology/security/telecom utilizes cable trays for wiring, include that information on coordination drawings.
 2. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 3. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical, plumbing, fire protection, and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 4. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 5. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 6. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 7. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts, and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 8. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal electrical conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 9. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 10. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
 11. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Division 01 Section "Submittal Procedures."
 - a. Prepare and submit drawings electronically as PDF files. The sheet size shall be no larger than 30 by 42 inches.
- C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
 2. Commence routing of coordination drawing files with HVAC Installer, who will provide

- drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
 4. Fire Sprinkler Installer will locate piping and equipment, using red color. Fire Sprinkler Installer shall forward drawing files to Electrical Installer.
 5. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
 6. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
 7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.

D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: DWG or BIM, operating in Microsoft Windows operating system.
2. File Submittal Format: Submit or post coordination drawing files using PDF format.
3. Architect will furnish Contractor one set of digital data files of the Architectural reflected ceiling and floor plans for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in BIM/Revit or AutoCAD.
 - c. Contractor and each subcontractor requesting this information shall execute a data licensing agreement in the form of Agreement included in this Project Manual.

1.8 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI to the Architect and Owner in the form specified, via electronic pdf format uploaded to web-based project management platform.

1. RFI shall originate from the Contractor.
2. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
3. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Names of Contractor, Owner, and Architect.
3. Architect's Project number.
4. Date.
5. Name of Contractor.
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. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Identify each page of attachments with the RFI number and sequential page number.
 2. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven (7) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within ten (10) calendar days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use software log that is part of web-based Project management software. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number, including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- F. Upon receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven (7) calendar days if Contractor disagrees with response.

1.9 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model or CAD drawings will be provided by Architect for Contractor's use during construction.
1. Architect will furnish Contractor one (1) set of digital data files for use in preparing Coordination Drawings, Shop Drawings, and Project Record Drawings. No files of proposed project elevations, sections or details will be issued to the Contractor.
 - a. DWG CAD files will be limited to the Architectural reflected ceiling and floor plans.
 - b. BIM Model, if available, will be furnished in RVT file format.
 2. Electronic file availability is limited to Architectural Floor Plans and Ceiling Plans.
 3. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 4. Digital Drawing Software Program: Contract Drawings are available in AutoCAD 2021 or Revit 2024; operating in Microsoft Windows operating system.
 5. The Owner must first authorize DBVW to release the requested electronic files. Upon receipt of the Owner's BIM/Electronic File Limit of Liability Form included at the end of this Section, the Contractor shall execute an Electronic CAD Drawing Limitation of Liability Form and/or a BIM Electronic File Limit of Liability Form included at the end of this Section. Transfer of any electronic files will not occur until all Forms have been received.
 - a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall each execute the same form identified above.
- B. Consolidated Documents: Consolidated Documents may be furnished to the Contractor by the Architect as a courtesy only; if requested in writing and accompanied by the Electronic PDF Limitation of Liability Form included at the end of this Section. Consolidated Documents do not take the place of formally issued Bid/Contract Documents and any Addendum.
1. Documents will be issued as PDF files compatible with Bluebeam Revu x64 Standard Version.
 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Documents and any Addendum.
- C. Web-Based Project Management Software Package: Provide, administer, and use a web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.
1. Web-based Project management software includes, at a minimum, the following features:
 - a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
 - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
 - c. Document workflow planning, allowing customization of workflow between project entities.
 - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
 - e. Track status of each Project communication in real time, and log time and date when responses are provided.
 - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
 - g. Processing and tracking of payment applications.
 - h. Processing and tracking of contract modifications.

- i. Creating and distributing meeting minutes.
 - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
 - k. Management of construction progress photographs.
 - l. Mobile device compatibility, including smartphones and tablets.
 2. Provide Project management software user licenses for use of Owner, Owner's Project Manager (OPM), Commissioning Agent, Architect, and Architect's consultants. If requested, provide up to 4 hours of software training at Architect's office for web-based Project software users.
 3. At both Substantial Completion and Final Completion, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
 4. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Autodesk, Inc.
 - b. Procore Technologies, Inc.
 - c. Equal as approved by Architect and Owner.
 5. Conduct a pre-construction meeting with Owner and Architect to review and establish protocols and requirements for notifications, distribution, and "ball in court" requirements.
 - a. Submittal review times must be set-up in accordance with Division 01 Section "Submittal Procedures" for each submission.
 - b. RFI review times must be set-up in accordance with this section, Paragraph 1.8.D.
 - c. Establish primary responsibility for RFI's, and submittals based upon trade or discipline. (i.e., Architectural, Structural, Civil, Mechanical, Electrical, etc.)
 - d. All submittals and RFI's require final review and action by Architect for release to Contractor.
 - e. Contractor shall set-up web-based project software based upon the pre-construction meeting.
 - D. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
 1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.
- 1.10 PROJECT MEETINGS
- A. General: Contractor shall schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of ten (10) working days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, OPM, and Architect, within five (5) working days of the meeting.
 - B. Preconstruction Conference: The Contractor shall schedule and conduct a preconstruction

conference before starting construction, at a time convenient to Owner, OPM, and Architect, but no later than seven (7) calendar days after execution of the Agreement. Hold the conference at Project site or another convenient location.

1. Attendees: Authorized representatives of Owner, OPM, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Use of premises and existing buildings/site.
 - d. Phasing.
 - e. Critical work sequencing and long lead items.
 - f. Designation of key personnel and their duties.
 - g. Lines of communications.
 - h. Use of web-based Project software.
 - i. Procedures for processing field decisions and Change Orders.
 - j. Procedures for RFIs.
 - k. Procedures for testing and inspecting.
 - l. Procedures for processing Applications for Payment.
 - m. Distribution of the Contract Documents.
 - n. Submittal procedures.
 - o. Work restrictions and hours.
 - p. Preparation of Record Documents.
 - q. Owner's occupancy requirements.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for moisture and mold control.
 - t. Procedures for disruptions and shutdowns.
 - u. Construction waste management and recycling.
 - v. Parking availability.
 - w. Office, work, and storage areas.
 - x. Equipment deliveries and priorities.
 - y. First aid.
 - z. Security.
 - aa. Progress cleaning.
3. Minutes: The Contractor shall record and distribute meeting minutes.

C. Preinstallation Conferences: The Contractor shall conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, OPM, Owner, and Owner's Commissioning Agent of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.

- h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - 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 having 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. The Contractor shall record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: The Contractor shall distribute minutes of the meeting to each party present and to other parties requiring information within three (3) working days of the meeting.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at weekly intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner, OPM, Owner's Commissioning Agent, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.

- 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of Proposal Requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
 4. Minutes: The Contractor shall record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- E. Coordination Meetings: The Contractor shall conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, OPM, Owner's Commissioning Agent, 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 meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Status of RFIs.

- 15) Proposal Requests.
 - 16) Change Orders.
 - 17) Pending changes.
 3. Reporting: The Contractor shall record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
- F. Project Closeout Conference: The Contractor will **schedule and conduct** a project closeout conference, at a time convenient to Owner, OPM, and Architect, but no later than thirty (30) days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, OPM, Owner's Commissioning Agent, HVAC Balancing & Testing subcontractor, HVAC controls subcontractor, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for delivery of material samples, attic stock, and spare parts.
 - g. Requirements for demonstration and training.
 - h. Preparation of Contractor's punch list.
 - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - j. Submittal procedures.
 - k. Coordination of separate contracts.
 - l. Owner's partial occupancy requirements.
 - m. Installation of Owner's furniture, fixtures, and equipment.
 - n. Responsibility for removing temporary facilities and controls.
 4. Minutes: The Contractor will record and distribute meeting minutes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100



111 CHESTNUT STREET
PROVIDENCE, RI 02903

401.831.1240

www.dbvw.com

BIM / ELECTRONIC FILE LIMIT OF LIABILITY

Providence City Hall Exterior Restoration, Phase I

At your request, **DBVW Architects Inc.**, hereafter "DBVW", is providing the below named contractor, hereafter the "Contractor", a building information model, hereafter "the BIM" and as the "electronic files", which contain the architectural and engineering drawings and databases for the above referenced project. The provisions of this agreement and release shall apply to all data contained with the BIM, including all views, families, objects, databases, sheets, and other content.

The Contractor hereby agrees to accept the BIM subject to the following terms and conditions:

A. In accepting delivery of the BIM, the Contractor acknowledges, understands, and agrees that:

1. The BIM prepared by DBVW contains representations of certain elements of the project and are not necessarily complete, nor is the BIM comparable or identical to final construction drawings. DBVW makes no representations or warranties with respect to the accuracy or completeness of the BIM.
2. DBVW recommends that the Contractor shall carefully review and compare the BIM with the corresponding final construction drawings to verify their accuracy and identify all discrepancies, differences, and inconsistencies in design, locations, dimensions, scope and all other requests between the BIM and the corresponding final construction drawings. The Contractor shall base its submission of shop drawings and, in general, shall base its performance of all its obligations with respect to the Project upon the information contained in the final construction drawings and not the BIM.
3. The Contractor agrees that by accepting delivery of the BIM, DBVW is not granting to the Contractor any ownership or property interest in the BIM and other instruments of service on electronic media contained therein. DBVW makes no warranties, either expressed or implied, regarding suitability or merchantability or fitness for any particular purpose. The Contractor's rights to use the BIM and Drawings are limited to use for the sole purpose of assisting in the Contractor's performance of its contractual obligations under its contract with respect to the Project. No further rights are being granted by DBVW under this Agreement and Release. Any re-use or other use, including, but not limited to automated conversion of the BIM, by the Contractor will be at the Contractor's sole risk and without liability to DBVW.
4. The Contractor hereby waives and releases any losses, claims, damages, liabilities of any nature whatsoever and costs (including attorney's fees) arising out of, resulting from, or otherwise relating to the use by the Contractor of the BIM and its contents, and the Contractor, to the maximum extent permitted by law, hereby agrees to indemnify, defend and hold DBVW harmless from all losses, claims, damages, liabilities and costs (including attorney's fees) arising out of, resulting from or otherwise relating to the use by the Contractor of the BIM or this Agreement and Release. The aforementioned indemnification

applies, without limitation, to any use of the project documentation on other projects, tenant improvements, alterations, or additions or for modification or completion of this project by others or for any use of DBVW's electronic documents by the Contractor for this project.

5. Nothing in this Agreement and Release shall be construed as to relieve the Contractor of any of its obligations (such as, by way of illustration, the obligation to make field measurements or to coordinate drawings) under its contract with respect to the Project.
 6. The Contractor shall not use the BIM as backgrounds for shop drawings. Drawings may be used for coordination and assistance in preparation of the Contractor's shop drawings, but may not be used as a substitute for original shop drawings prepared by the Contractor. Coordination of shop drawings with actual construction documents is the responsibility of the Contractor. The Contractor shall anticipate detailing and coordinating the project independent of any BIM.
 7. The Contractor shall not share the contents of the BIM with any other party, unless specifically permitted to do so by DBVW.
- B. The Contractor shall recognize that the BIM is the result of substantial effort on the part of DBVW. The Contractor shall not share the contents of the BIM with any other party unless expressly permitted by DBVW. Additionally, the Contractor shall not use the BIM or any part thereof for any other project, including renovations or tenant improvements to the Project at a later date, without the express written permission of DBVW.
- C. The Contractor agrees to credit DBVW in any media, publicity, published articles, marketing, advertising, or any other document containing reference to the BIM and its application to this project.

By signing this agreement, a Subcontractor confirms that the Subcontractor has notified the General Contractor and will provide the General Contractor with a copy of the "Agreement and Release form". All subcontractors must sign this agreement (i.e., signature by the general contractor shall not be sufficient to allow permission of the use of the BIM by an individual subcontractor).

This Agreement and Release, executed under seal, shall be governed by the applicable state and local laws, and shall be binding upon DBVW and the Contractor and their respective successors, assigns, and legal representatives.

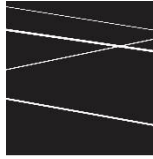
Contractor: _____

Company Officer: _____

Signature: _____
Hereunto duly authorized

Title: _____

Date: _____



DBVW
ARCHITECTS

111 CHESTNUT STREET
PROVIDENCE, RI 02903

401.831.1240

www.dbvw.com

PDF / ELECTRONIC FILE LIMIT OF LIABILITY

Providence City Hall Exterior Restoration, Phase I

At your request, **DBVW Architects Inc.** is providing electronic pdf files for your convenience, subject to the following terms and conditions.

By accepting and using the pdf files, you agree to the following terms and conditions:

DBVW Architects Inc. electronic files are compatible with Bluebeam Revu x64 Standard Version 20. DBVW Architects Inc. makes no representation as to the compatibility of these files with your hardware or your software beyond the specified release of the referenced specifications.

Data contained in these electronic files is part of DBVW Architects Inc.'s instruments of service and shall not be used by you or anyone else receiving this data through or from you for any purpose other than as a convenience for the referenced project. Any other use or reuse by you or by others will be at your sole risk and without liability or legal exposure to DBVW Architects Inc. You agree to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against DBVW Architects Inc., its officers, directors, employees, agents, or sub consultants which may arise out of or in connection with your use of the electronic files.

Furthermore, you shall, to the fullest extent permitted by law, indemnify, defend, and hold DBVW Architects Inc. harmless from all claims, damages, losses, and expenses, including attorney's fees arising out of or resulting from your use of these electronic files. These electronic files are not contract documents. They should be used for reference only. Differences may exist between these electronic files and corresponding hard copy documents and all Addenda, which are considered the Contract Documents. DBVW Architects Inc. makes no representation regarding the accuracy or completeness of the electronic files you receive.

Because of the potential that the information presented on the electronic files can be modified, unintentionally or otherwise, DBVW Architects Inc. reserves the right to remove all indicia of its ownership and/or involvement for each electronic display. Under no circumstances shall delivery of the electronic files for use by you be deemed a sale by DBVW Architects Inc. DBVW Architects Inc.'s makes no warranties, either expressed or implied, of merchantability and fitness for any particular purpose. In no event shall DBVW Architects Inc. be liable for any loss or profit or any consequential damages.

By: _____

Date: _____

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's Construction Schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Field / site condition reports.
 - 7. Special / unusual event reports.
- B. Related Requirements:
 - 1. Division 01 Section "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.
 - 2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 - 3. Division 01 Section "Submittal Procedures" for submittal schedules and reports.
 - 4. Division 01 Section "Quality Requirements" for schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.

- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of labor and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file.
 - 2. PDF file.
- B. Startup construction schedule.
 - 1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports to contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
 - 3. Total Float Report: List of activities sorted in ascending order of total float.
 - 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Daily Construction Reports: Submit at monthly intervals.
- H. Material Location Reports: Submit at weekly intervals.
- I. Field Condition / Site Condition Reports: Submit at time of discovery of differing conditions.

- J. Special Reports / Unusual Event Reports: Submit at time of unusual event.
- K. Certified Payroll Records: Submit at weekly intervals to the Owner.
- L. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Owner occupancy.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review submittal requirements and procedures.
 - 7. Review time required for review of submittals and resubmittals.
 - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
 - 10. Review and finalize list of construction activities to be included in schedule.
 - 11. Review procedures for updating schedule.
 - 12. Establish mandatory milestone dates and finish dates within each phase.
 - 13. Review delivery dates for furniture, furnishings, and equipment.
- B. The Contractor's Construction Schedule will be reviewed by the Architect and Owner for general logic and conformance with the specified date for Substantial Completion. This does not relieve the Contractor of the responsibility for completing the work within the Contract Time. It is not an endorsement of the success of the construction schedule, nor shall it make the Architect and Owner liable for time or cost overruns as a result of potential shortcomings.

1.6 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, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.
- C. Calendar: Compile a project calendar for use in scheduling. Incorporate all limitations on working days and working hours, including legal holidays, other non-working days determined by the Contractor and optional working days determined by the Contractor.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
 - 1. Use Microsoft Project, Primavera, Meridian Prolog, or equivalent software for current Windows operating system.
- B. Time Frame: Extend schedule from date established for the Notice of Award to date of Final Completion.
 - 1. Contract completion date to not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than twenty (20) working days, unless specifically allowed by Architect and Owner.
 - 2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
 - a. Securing of approvals and permits required for performance of the Work.
 - b. Temporary facilities.
 - c. Construction of mock-ups, prototypes, and samples.
 - d. Owner interfaces and furnishing of items.
 - e. Interfaces with Separate Contracts.
 - f. Regulatory agency approvals.
 - g. Punch list.
 - 3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than sixty (60) calendar days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 4. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 - 5. Startup and Testing Time: Include no fewer than ten (10) working days for startup and testing.
 - 6. Commissioning Time: Include no fewer than thirty (30) calendar days prior to Substantial Completion for Owner's commissioning agent to verify and check building systems.
 - 7. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 - 8. Punch List: Include fifteen (15) working days for punch list.
 - 9. Final Completion: Include thirty (30) calendar days for final completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Arrange list of activities on schedule by phase, and by areas of renovation, new additions, and site work.
 - 2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 - 3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the

- earliest possible delivery date.
5. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use-of-premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Building flush-out.
 - m. Startup and placement into final use and operation.
 - n. Commissioning.
 7. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Demolition.
 - b. Foundations.
 - c. Site Utilities.
 - d. Structure, concrete slabs, and rough framing.
 - e. Temporary enclosure and space conditioning.
 - f. Permanent space enclosure.
 - g. Completion of fire protection, plumbing, mechanical, and electrical systems.
 - h. Substantial Completion.
 8. Other Constraints: Include the following activities in each trade in each phase.
 - a. Interface between Contractor and Subcontractor.
 - b. Utility connections to each piece of equipment.
 - c. Concrete finishing.
 - d. Site work constraints on other activities.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- F. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. See Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
 2. Contractor shall assign cost to construction activities on the schedule. Costs shall not be

- assigned to submittal activities unless specified otherwise but may, with Architect's approval, be assigned to fabrication and delivery activities. Costs shall be under required principal subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training.
3. Each activity cost shall reflect an accurate value subject to approval by both the Architect and Owner.
 4. Total cost assigned to activities shall equal the total Contract Sum.
- G. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and the Contract Time.
- H. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Final Completion percentage for each activity.
 4. Evaluate progress of the work jointly with the Owner and Architect at the end of each week to show progress and identify conflicts.
- I. Recovery Schedule: When periodic update indicates the Work is fourteen (14) or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- J. Distribution: Distribute both hardcopies and electronic PDF format of approved schedule to Architect and Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.
- 1.8 STARTUP CONSTRUCTION SCHEDULE
- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule in electronic PDF format within seven (7) calendar days of date established for the Notice of Award.
- B. Submittal Schedule: Within fourteen (14) calendar days of the date established for Notice of award, provide a submittal schedule as defined in Division 01 Section "Submittal Procedures".

- C. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first thirty (30) calendar days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.9 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule in electronic PDF format within seven (7) calendar days of date established for the Notice of Award.
 - 1. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in ten percent (10%) increments within time bar.

1.10 REPORTS

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

2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C. Field / Site Condition Reports: Immediately upon discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Special / Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare, and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within one (1) working day of an occurrence. Distribute copies of report to parties affected by the occurrence.

1.11 RI PUBLIC PROJECT CERTIFIED PAYROLL RECORDS

- A. The General Contractor shall comply and shall cause each Subcontractor to comply with Rhode Island General Law to submit a certified payroll with a statement of compliance on a weekly basis, by first class mail or by electronic email. Records must contain a signed statement by the employer that indicates the records are correct and the rate of wages that each worker receives. A true and accurate record be kept of all persons employed on the project for which the prevailing wage rates have been provided. The Contractor and all Subcontractors shall keep these records and preserve them for a period of three years from the date of completion of the Contract. Such records shall be open to inspection by any authorized representative of the Owner at any reasonable time, and as often as may be necessary. The Contractor shall, and shall cause its subcontractors to, submit weekly copies of their weekly payroll records to the Awarding Authority. In addition, the Contractor and each Subcontractor shall furnish to the Department of Labor within fifteen days after completion of its portion of the Work a signed statement in the form required by the Awarding Authority.
- B. The Owner has the authority to verify payroll reports by checking employees' pay stubs and personal identification.
- C. The Owner may withhold a portion of the Application for Payment if payroll reports have not been submitted for a portion of the Work.
- D. The Contractor shall be liable for any and all payroll violations and shall defend, indemnify, and hold harmless the Owner, OPM, and the Architect.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE COMPLIANCE

- A. Whenever it becomes apparent from the current schedule that delays to the critical path have resulted and Contract completion date will not be met, or when so directed by the Architect, and/or Owner, take some or all of the following actions at no additional cost to the Owner:

1. Submit to the Architect and Owner, a written recovery statement of proposed methods to remove or arrest delay to critical path in approved schedule, and a proposed schedule with the corresponding revisions in activities and logic ties.
 2. Increase construction manpower as necessary to substantially eliminate backlog of work.
 3. Increase the number of working hours per shift, shifts per day, working days per week, amount of construction equipment, or any combination therefore, sufficiently to substantially eliminate backlog of work.
 4. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities and comply with revised schedule.
- B. If Contractor fails to submit a written statement of proposed methods or fails to take such steps as requested and approved by the Owner and/or Architect, the Owner may direct the Contractor to increase the level of effort in manpower (trades), equipment and work schedule including overtime, weekend, and holiday work, to be employed by Contractor in order to remove or arrest delay to the critical path in approved schedule.
1. The Contractor shall promptly provide this effort at no additional cost to the Owner.
- C. Contractor's failure, refusal, or neglect to promptly comply with these schedule recovery requirements shall be reasonable evidence that Contractor is not prosecuting the Work with due diligence. Any such failure, refusal or neglect shall give sufficient basis to the Owner to elect any of the following:
1. Demand adequate written assurance of performance.
 2. Withhold liquidated damages (if any in Contract), and at the Owner's sole discretion, direct alternate schedule recovery actions.
 3. Terminate the Contractor.

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Concealed Work photographs.
 - 3. Periodic construction photographs.
- B. Related Requirements:
 - 1. Division 01 Section "Submittal Procedures" for submitting photographic documentation.
 - 2. Division 01 Section "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
 - 3. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
 - 4. Division 02 Section "Selective Demolition" for photographic documentation before selective demolition operations commence.
 - 5. Division 31 Section "Site Clearing" for photographic documentation before site clearing operations commence.

1.3 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph and video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within seven (7) calendar days of taking photographs.
 - 1. Submit photos on thumb-drive and by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description 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 location, vantage point, and direction.
 - g. Unique sequential identifier keyed to accompanying key plan.
- C. Video Recordings: Submit video recordings within seven (7) calendar days of recording.
 - 1. Submit video recordings on thumb drive and by uploading to web-based Project

management software site. Include copy of key plan indicating each video's location and direction.

2. Identification: With each submittal, provide the following information 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 video recording was recorded.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
3. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in three-ring binders. Provide label on front and spine. Include a cover sheet with label information. Include name of Project and date of video recording on each page
 - a. Submit hardcopies, in number as required by O&M Manuals and Demonstration and Training.

1.4 QUALITY ASSURANCE

- A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three (3) years.

1.5 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 18 megapixels, and at an image resolution of not less than 3200 by 2400 pixels, and with vibration-reduction technology]. Use flash in low light levels or backlit conditions.
- B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full high-definition mode with vibration-reduction technology. Provide supplemental lighting in low light levels or backlit conditions.
- C. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- D. Metadata: Record accurate date and time from camera.
- E. File Names: Name media files with date, Project area, and sequential numbering suffix.

1.6 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs with maximum depth of field and in focus.
 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
 2. Obtain and transfer copyright usage rights from photographer to Owner for unlimited reproduction of photographic documentation.
- C. Preconstruction Photographs: Before commencement of the Work, take photographs of Project

site and surrounding properties, including existing items to remain during construction, from different vantage points.

1. Flag excavation areas and construction limits before taking construction photographs.
 2. Take at least twenty (20) photographs to show existing conditions adjacent to property before starting the Work.
 3. Take at least twenty (20) photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
 5. Submit electronically at 25%, 50% and 75% Project Completion Stages, in accordance with percentages identified on the Application for Payment.
- D. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
1. Underground utilities.
 2. Underslab services.
 3. Piping.
 4. Electrical conduit.
 5. Waterproofing and weather-resistant barriers.
- E. Periodic Construction Photographs: Take at least twenty (20) photographs weekly. Submit monthly to coincide 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.
- F. Additional Photographs: Architect or Owner may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
1. Three (3) working days' notice will be given, where feasible.
 2. In emergency situations, take additional photographs within 24 hours of request.
 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Photographs are to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Submittal schedule requirements.
 - 2. Administrative and procedural requirements for submittals, including but not limited to shop drawings, product data, samples, and other submittals.
- B. Related Requirements:
 - 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
 - 2. Division 01 Section "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
 - 3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 4. Division 01 Section "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and Final Completion construction photographs.
 - 5. Division 01 Section "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
 - 6. Division 01 Section "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
 - 7. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 8. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 9. Divisions 02 through 50 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent

fixed-layout document format.

1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first thirty (30) days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
 4. Format: Arrange the following information in a tabular format:
 - a. Submittal number.
 - b. Scheduled date for first submittal.
 - c. Specification Section number and title.
 - d. Submittal Category: Action; informational.
 - e. Name of subcontractor.
 - f. Description of the Work covered.
 - g. Scheduled date for Architect's final release or approval.
 - h. Scheduled dates for purchasing.
 - i. Scheduled date of fabrication.
 - j. Scheduled dates for installation.
 - k. Activity or event number.
- B. Update the submittals schedule periodically as the work progresses. Submit concurrently with each Application for Payment.
- C. Utilize approved Web-Based Project Management Software to manage submittals. Submit the following reports weekly:
1. Complete list of reviewed submittals.
 2. Listing of submittals to date.
 3. Listing of approved submittals.
 4. Listing of rejected submittals.
 5. Listing of submittals returned for correction.
 6. List of outstanding submittals.
- D. At the request of the Architect, OPM or Owner, provide reports capable of being sorted by the following criteria:
1. Approved status.
 2. Subcontractor/Supplier.
 3. Submission date.
 4. Number of days late for return.
 5. Number of days under review.

1.5 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
1. Project name.
 2. Date.
 3. Name of Architect.
 4. Name of Contractor.
 5. Name of firm or entity that prepared submittal.
 6. Names of subcontractor, manufacturer, and supplier.
 7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
 - a. Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01).
Re-submittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 8. Category and type of submittal.
 9. Submittal purpose and description.
 10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
 11. Drawing number and detail references, as appropriate.
 12. Indication of full or partial submittal.
 13. Location(s) where product is to be installed, as appropriate.
 14. Other necessary identification.
 15. Remarks.
 16. Signature of transmitter.
- B. Options: Identify options requiring selection by Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.
- D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.
- E. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.
- F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.
1. Transmittal Form: Utilize Contractor generated form with the following information:
 - a. Project name and Date.
 - b. Destination (To:).
 - c. Source (From:).
 - d. Names of subcontractor, manufacturer, and supplier.
 - e. Category and type of submittal.
 - f. Submittal purpose and description.
 - g. Specification Section number and title.
 - h. Drawing number and detail references, as appropriate.

- i. Transmittal number, numbered consecutively.
 - j. Submittal and transmittal distribution record.
 - k. Remarks.
 - l. Signature of transmitter.
2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests 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.

1.6 SUBMITTAL PROCEDURES

- A. General: Electronic copies of Drawings of the Contract Documents may be provided by Architect for Contractor's use in preparing submittals and coordination drawings. Contractor must sign waiver forms in Project Manual and send the request to the Architect prior to issuance of the files. The Architect reserves the right to reject any and all requests. Refer to Division 01 Section "Contract Modification Procedures" for Digital Management Procedures.
 1. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 2. Electronic CAD or Revit files of the Architectural plans may be available. No CAD or Revit files of Project sections or details will be issued to the Contractor.
- B. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections. Provide the following, consistently, for the duration of the project:
 1. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.
 2. Submit four (4) hardcopies of each physical sample and one (1) in electronic PDF format.
 3. No hardcopies will be distributed. Provide hardcopies as required for incorporation into Project Record Documents.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
 - b. Coordinate transmittal of all submittals requiring color selection, so that comprehensive selection can be processed.
- D. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

1. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
- E. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow fourteen (14) calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow fourteen (14) calendar days for review of each resubmittal.
 - a. Re-submittals will be reviewed no more than one (1) time at the Owner's expense. Re-submittals which fail to comply with Contract requirements will be reviewed at the Contractor's expense, based on an hourly rate of \$200 per hour, not to exceed \$2,000 for each subsequent submittal.
 - b. The Owner reserves the right to deduct said reimbursement from the Contractor's monthly Application for Payment.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow twenty-one (21) calendar days for initial review of each submittal.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow fourteen (14) calendar days for review of each submittal. Submittal will be returned to Architect, before being returned to Contractor.
 6. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- F. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp, either "Approved" or "Approved as Noted."
 4. The Contractor shall resubmit submittals that are returned from the Architect as "Revise and Resubmit" or "Not Approved" using the same submittal number as the original submittal. The Contractor shall revise the Review number (R1, R2, etc.), as appropriate.
 5. If utilizing web-based project management software, log each resubmittal as a new transmittal with the required review time per Paragraph 1.6.D.3 of this section. Submittals logged under previous transmittal numbers and timelines shall be returned as "No Action Taken".
- G. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- H. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals with mark indicating "Approved" or "Approved as Noted" taken by the Architect.
1. Provide one (1) full size, color hardcopy of each approved submittal or shop drawing directly to the Owner.

1.7 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's written recommendations and product specifications.
 - c. Manufacturer's installation instructions.
 - d. Color charts.
 - e. Statement of compliance with specified referenced standards.
 - f. Testing by recognized testing agency.
 - g. Application of testing agency labels and seals.
 - h. Notation of coordination requirements.
 - i. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Roughing-in and setting diagrams.
 - d. Wiring diagrams showing field-installed wiring; include power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed.
 - e. Shop work manufacturing instructions.
 - f. Templates and patterns.
 - g. Schedules.
 - h. Design calculations, stamp, and signature of responsible third-party engineer, where specified.
 - i. Compliance with specified standards.
 - j. Notation of coordination requirements.
 - k. Notation of dimensions established by field measurement.
 - l. Relationship and attachment to adjoining construction clearly indicated.
 2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches. Follow general submittal procedure requirements.
- C. Coordination Drawings: Comply with requirements in Division 01 Section "Project Management and Coordination."
- D. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

1. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.
 2. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
 3. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 4. Provide the following:
 - a. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
 5. 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 are the property of the Owner.
 6. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two (2) full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return one (1) submittal with options selected.
 7. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured, and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three (3) sets of Samples. Architect and Owner will retain two (2) sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three (3) sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.

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

to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

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

1.8 DELEGATED DESIGN SERVICES

- A. Comply with Division 01 Section "Quality Requirements".
- B. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- C. Delegated Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file, 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.

1.9 CONTRACTOR'S REVIEW

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

1.10 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required. Architect will indicate, via markup on each submittal, the appropriate action, as follows:
 1. **Approved:** The portion of Work covered by the submittal may proceed provided it complies with the Contract Documents.
 2. **Approved as Noted:** The portion of Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal, and with the Contract

Documents.

3. **Revise and Resubmit:** Revise or prepare a new submittal in accordance with notations; resubmit. Do not proceed with that portion of the Work covered by the submittal.
 4. **Rejected:** Submittal does not conform to Contract Documents. Revise or prepare a new submittal and resubmit. Do not proceed with that portion of the Work covered by the submittal.
- B. Informational Submittals: Architect will review each submittal. Architect will forward each submittal to appropriate party.
1. General: Prepare and submit Informational Submittals required by other Specification Sections. Follow general submittal procedure requirements in Paragraph 2.1.A.
 - a. Architect will return copies marked "Reviewed."
 - b. Certificates 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.
 2. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."
 3. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
 4. 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 of firms and personnel certified.
 5. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 6. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 7. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
 8. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
 9. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
 10. Product Test Reports: Submit 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.
 11. Research/Evaluation Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation, and time period when report is in effect.
 - c. Product and manufacturers' names.
 - d. Description of product.
 - e. Test procedures and results.
 - f. Limitations of use.
 12. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."

13. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
 14. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
 15. Field Test Reports: Submit 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.
 16. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
 17. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of the manufacturer. Include the following, as applicable:
 - a. Preparation of substrates.
 - b. Required substrate tolerances.
 - c. Sequence of installation or erection.
 - d. Required installation tolerances, and adjustments.
 - e. Recommendations for cleaning and protection.
 18. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - a. Name, address, and telephone number of factory-authorized service representative making report.
 - b. Statement on condition of substrates and their acceptability for product installation.
 - c. Statement that products at Project site comply with requirements.
 - d. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - e. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - f. Statement whether conditions, products, and installation will affect warranty.
 - g. Other required items indicated in individual Specification Sections.
 19. Material Safety Data Sheets (MSDS): Submit information directly to Owner; do not submit to Architect. Architect will not review submittals that include MSDS and will return the entire submittal for re-submittal.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will return without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 013591 - HISTORIC TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general protection and treatment procedures for Work in designated historic spaces, areas, rooms, and surfaces in Project.
 - 1. Work also includes salvaged items indicated to be re-used in this Project.
- A. Individual specification sections identify required historic qualifications for contractor and sub-contractors. These qualifications may be met by either the firm's own forces or by contracting with a qualified and experienced sub-sub-contractor.
 - 1. Firms must demonstrate at least ten (10) years of experience with similar projects.
 - 2. Provide a list of three (3) recent projects.
 - 3. Field Supervision: Maintain experienced full-time supervisors on Project site during times that restoration work is in progress.
 - 4. Restoration Worker: Personnel with direct experience in type of work being performed.
- B. Related Requirements:
 - 1. Division 00 Section "Environmental" for hazardous material information and abatement.
 - 2. Division 01 Sections "Temporary Facilities and Controls"; "Photographic Documentation"; and "Construction Waste Management".
 - 3. Division 02 Section "Selective Demolition" for selective demolition information.
 - 4. Division 04 Section "Historic Masonry Repair" for repairing masonry.
 - 5. Division 04 Section "Historic Masonry Cleaning" for cleaning masonry.
 - 6. Division 08 Section "Historic Treatment of Wood Windows" for wood window restoration.
 - 7. Division 09 Section "Painting" for finish painting.

1.3 DEFINITIONS

- A. Consolidate: To strengthen loose or deteriorated materials in place.
- B. Design Reference Sample: A sample that represents Architect's pre-bid selection of work to be matched; it may be existing work or work specially produced for Project.
- C. Dismantle: To disassemble or detach a historic item from a surface, or a non-historic item from a historic surface, using gentle methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
 - 1. Use only small hand tools and/or small one-hand power tools.
- D. Existing to Remain: Existing items that are not to be removed or dismantled.
- E. Feathering: Light sanding, performed after damaged material has been removed by scraping,

to soften abrupt transitions between bare substrate and remaining intact paint; or exposed layers of intact paint; or patching materials and the surrounding surface. Proper feathering will produce a surface that, after painting, has no edges that can be lifted with a fingernail.

- F. Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance that are important to the successful preservation and/or restoration as determined by Architect. Designated historic spaces, areas, rooms, surfaces, materials, and finishes are indicated on Drawings and scheduled herein.
- G. Salvaged Items: Where indicated on the Drawings, re-install salvaged materials and treat as historic materials consistent with requirements indicated in the Section.
- H. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- I. Material in Kind: Material that matches existing materials, as much as possible, in material composition or species, cut, color, grain, and finish.
- J. Preservation: To apply measures necessary to sustain the existing form, integrity, and materials of a historic property. Work may include preliminary measures to protect and stabilize the property.
- K. Protect and Maintain: To remove deteriorating corrosion, reapply protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.
- L. Reconstruction: To reproduce in the exact form and detail a building, structure, or artifact as it appeared at a specific period in time.
- M. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- N. Rehabilitation: To make possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features that convey its historical, cultural, or architectural values.
- O. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.
- P. Remove: To take down or detach a non-historic item located within a historic space, area, or room, using methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- Q. Remove and Salvage: To detach items from existing construction and deliver them to Owner ready for reuse.
- R. Remove and Reinstall: To detach items from existing construction, repair and clean them for reuse, and reinstall them where indicated.
- S. Repair: To correct damage and defects, retaining existing materials, features, and finishes while employing as little new material as possible. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
 - 1. Within restoration, repair also includes limited replacement in kind, rehabilitation, and reconstruction, with compatible substitute materials for deteriorated or missing parts of

features when there are surviving prototypes.

- T. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
 - 1. Duplication: Includes replacing elements damaged beyond repair or missing. Original material or item is the pattern for creating new duplicated elements unless otherwise indicated.
 - 2. Replacement with New Materials: Includes replacement with new material when original material is not available as patterns for creating new duplicated elements.
 - 3. Replacement with Substitute Materials: Includes replacement with compatible substitute materials. Substitute materials are not allowed, unless otherwise indicated.
- U. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- V. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- W. Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.
- X. Restoration: To accurately depict the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and the reconstruction of missing features from the restoration period.
- Y. Retain: To keep an element or detail secure and intact.
 - 1. Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled.
- Z. Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials unless otherwise indicated.
- AA. Salvage: To protect removed or dismantled items and deliver them to Owner.
- BB. Stabilize: To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.
- CC. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 COORDINATION

- A. Historic Treatment Sub-Schedule: A construction schedule coordinating the sequencing and scheduling of historic treatment work for entire Project, including each activity to be performed in historic spaces, areas, and rooms, and on historic surfaces; and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for historic treatment work.
 - 1. Schedule construction operations in sequence required to obtain best historic treatment results.
 - 2. Coordinate sequence of historic treatment work activities to accommodate the following:
 - a. Owner's continuing occupancy of portions of existing building.
 - b. Owner's partial occupancy of completed Work.
 - c. Other known work in progress.
 - d. Tests and inspections.

3. Detail sequence of historic treatment work, with start and end dates.
4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
5. Use of elevator and stairs.
6. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use. Do not use such equipment without certification from Contractor's professional engineer that the structure can support the imposed loadings without damage.

1.5 PROJECT MEETINGS FOR HISTORIC TREATMENT

- A. Preliminary Historic Treatment Conference: Before starting historic treatment work, conduct conference at Project site.
1. Attendees: In addition to representatives of Owner, Owner's Project Manager, Architect, and Contractor, testing service representative, historic treatment specialists, chemical-cleaner manufacturer(s), and installers whose work interfaces with or affects historic treatment shall be represented at the meeting.
 2. Agenda: Discuss items of significance that could affect progress of historic treatment work, including review of the following:
 - a. Historic Treatment Sub-Schedule: Discuss and finalize; verify availability of materials, historic treatment specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Fire-prevention plan.
 - c. Governing regulations.
 - d. Areas where existing construction is to remain and the required protection.
 - e. Hauling routes.
 - f. Sequence of historic treatment work operations.
 - g. Storage, protection, and accounting for salvaged and specially fabricated items.
 - h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
 - i. Qualifications of personnel assigned to historic treatment work and assigned duties.
 - j. Requirements for extent and quality of work, tolerances, and required clearances.
 - k. Methods and procedures related to historic treatments, including product manufacturers' written instructions and precautions regarding historic treatment procedures and their effects on materials, components, and vegetation.
 - l. Embedded work such as flashings and lintels, special details, collection of wastes, protection of occupants and the public, and condition of other construction that affect the Work or will affect the work.
 3. Reporting: Contractor shall record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.
- B. Coordination Meetings: Conduct specifically for historic treatment work at bi-weekly intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, Owner's Project Manager, Architect, and Contractor, each historic treatment specialist, supplier, installer, and other entity concerned with progress or involved in planning, coordination, or performance of historic treatment work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to historic treatment work.
 2. Agenda: Review and correct or approve minutes of previous coordination meeting.

Review other items of significance that could affect progress of historic treatment work. Include topics for discussion as appropriate to status of Project.

- a. Historic Treatment Sub-Schedule: Review progress since last coordination meeting. Determine whether each schedule item is on time, ahead of schedule, or behind schedule. Determine how construction behind schedule will be expedited with retention of quality; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
 - b. Schedule Updating: Revise Contractor's Historic Treatment Sub-Schedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each entity present, including review items listed in the "Preliminary Historic Treatment Conference" Paragraph in this article and the following:
 - 1) Interface requirements of historic treatment work with other Project Work.
 - 2) Status of submittals for historic treatment work.
 - 3) Access to historic treatment work.
 - 4) Effectiveness of fire-prevention plan.
 - 5) Quality and work standards of historic treatment work.
 - 6) Change Orders for historic treatment work.
3. Reporting: Contractor shall record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.
 1. Carefully dismantle and salvage each item or object and protect it from damage, then promptly deliver it to Owner where directed.

1.7 SUBMITTALS

- A. Historic Treatment Sub-Schedule:
 1. Submit historic treatment sub-schedule within seven (7) calendar days of date established for commencement of historic treatment work.
- B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by Contractor's historic treatment operations. Submit before work begins.
- C. Historic Treatment Program: Submit thirty (30) calendar days before work begins.
- D. Alternative Methods and Materials: If alternative methods and materials to those indicated are proposed for any phase of work, provide a written description including evidence of successful use on other, comparable projects, and program of testing to demonstrate effectiveness for use on this Project.
- E. Fire-Prevention Plan: Submit thirty (30) calendar days before work begins.

- F. Inventory of Salvaged Items: After removal or dismantling work is complete, submit a list of items that have been salvaged.

1.8 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: An experienced firm regularly engaged in historic treatments similar in nature, materials, design, and extent to the work as specified in each Section and that has completed a minimum of five (5) recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.
1. Firm and employees shall have at least ten (10) years' experience in Work similar in nature to that required for this Project; and that has a successful in-service performance of at least seven (7) years.
 2. Field Supervisor Qualifications: Full-time supervisors experienced in historic treatment work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on site when historic treatment work begins and during its progress. Supervisors shall not be changed during Project except for causes beyond control of the specialist firm.
 - a. Construct new mockups of required work whenever a supervisor is replaced.
- B. Title X Requirement: Each firm conducting activities that disturb painted surfaces shall be a "Lead-Safe Certified Firm" according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe work practices.
- C. Historic Treatment Program: Prepare a written plan for historic treatment for whole Project, including each phase or process and protection of surrounding materials during operations. Describe in detail the materials, methods, and equipment to be used for each phase of work. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project historic treatment program with specific requirements of programs required in other historic treatment Sections.
1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
 2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.
- D. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.
- E. Safety and Health Standard: ANSI/ASSP A10.6.
- C. Mockups: Prepare mockups of specific historic treatment procedures specified in this section and elsewhere in the Project Manual to demonstrate aesthetic effects and to set quality standards for materials and execution.
1. Typical Removal Work: Remove typical as shown on Drawings.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves in writing.

1.9 STORAGE AND HANDLING OF HISTORIC MATERIALS

- A. Identification: Photograph, tag, and catalog historic items to be salvaged or reinstalled.
 - 1. Identify each item with a nonpermanent location identification tag indicating item name or use, location, and location identification number to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying tag.
 - a. For groups of material, such as brick, provide location identification tag for pallet or container. Do not tag individually.
- B. Salvaged Historic Materials:
 - 1. Clean loose dirt and debris from salvaged historic items unless more extensive cleaning is indicated.
 - 2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area.
 - 5. Protect items from damage during transport and storage.
- C. Historic Materials for Reinstallation:
 - 1. Repair and clean historic items for reuse as indicated.
 - 2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.
- D. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.
- E. Storage and Protection: Store historic items within a weathertight enclosure where they are protected from moisture, weather, condensation, ground water, and extreme hot or cold temperature variations.
 - 1. Identify each item with an inconspicuous, non-permanent mark indicating their original location.
 - 2. Indicate original locations on plans, elevations, sections, or photographs by annotating with the identifying marks.
 - 3. Secure stored materials to protect from theft.
 - 4. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F or more above the dew point.

1.10 FIELD CONDITIONS

- A. Size Limitations in Historic Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12-inches or more.

- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Preparation for Removal and Dismantling: Examine construction to be removed or dismantled to determine best methods to perform removal and dismantling work safely and effectively. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed or dismantled and location of utilities and services to remain that may be hidden by construction that is to be removed or dismantled.
 - 1. Verify that affected utilities have been disconnected and capped.
 - 2. Inventory and record the condition of items to be removed and dismantled for reinstallation or salvage.
 - 3. Before removal or dismantling of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
 - 4. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures as a result of removal and dismantling work.
- B. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
- C. Perform surveys as the Work progresses to detect hazards resulting from historic treatment procedures.

3.2 PROTECTION

- A. Refer to Division 01 Section "Temporary Facilities and Controls" and Division 02 Section "Selective Demolition" for project requirements.
- B. Ensure that supervisory personnel are present when Work begins and during its progress.
- C. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from historic treatment procedures.
 - 1. Use only proven protection methods, appropriate to each area and surface being protected.
 - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where historic treatment work is being performed.
 - 3. Erect temporary barriers to form and maintain fire-egress routes.
 - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during historic treatment work.

5. Contain dust and debris generated by historic treatment work, and prevent it from reaching the public or adjacent surfaces.
6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
8. Provide supplemental sound-control treatment to isolate removal and dismantling work from other areas of the building.

D. Temporary Protection of Historic Materials:

1. Protect existing historic materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
2. Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Architect.

E. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

F. Utility and Communications Services:

1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by historic treatment work before commencing operations.
2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for historic treatment work.
3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

G. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.

1. Prevent solids such as stone or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from historic treatment work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

H. Existing Roofing: Prior to the start of work in an area, install roofing protection.

3.3 PROTECTION FROM FIRE

A. Follow fire-prevention plan and the following:

1. Comply with NFPA 241 requirements unless otherwise indicated. Perform duties titled "Owner's Responsibility for Fire Protection."
2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
 - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
3. Prohibit smoking by all persons within Project work and staging areas.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures

while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:

1. Obtain Owner's approval for operations involving use of welding or other high-heat equipment. Use of open-flame equipment is not permitted. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that area is safe.
4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
 - a. Train each fire watch in proper operation of fire-control equipment and alarms.
 - b. Prohibit fire-watch personnel from other work that would distract from fire-watch duties.
 - c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
 - d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work[in each area] to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
 - e. Maintain fire-watch personnel at each area of Project site until 60 minutes after conclusion of daily work.

C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for type of fire risk in each work area. Ensure that nearby personnel and fire-watch personnel are trained in fire-extinguisher and blanket use.

D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.

1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

3.4 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in historic treatment program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied.

Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.
- E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.5 GENERAL HISTORIC TREATMENT

- A. Have historic treatment work performed only by qualified historic treatment specialists.
- B. Ensure that supervisory personnel are present when historic treatment work begins and during its progress.
- C. Perform daily inspections of Project site as the Work progresses to detect hazards resulting from historic treatment procedures.
- D. Halt the process of deterioration and stabilize conditions unless otherwise indicated.
- E. Perform work as indicated on Drawings. Follow the procedures in subparagraphs below and procedures approved in historic treatment program unless otherwise indicated:
 - 1. Retain as much existing material as possible; repair and consolidate rather than replace.
 - 2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
 - 3. Use reversible processes wherever possible.
 - 4. Use historically accurate repair and replacement materials and techniques unless otherwise indicated.
 - 5. Record existing work before each procedure (preconstruction) and progress during the work with digital preconstruction documentation photographs. Comply with requirements in Division 01 Section "Photographic Documentation."
- F. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
 - 1. Do not proceed with the work in question until directed by Architect.
- G. Where missing features are indicated to be repaired or replaced, provide work with appearance based on accurate duplications rather than on conjecture, subject to approval of Architect.
- H. Where work requires existing features to be removed or dismantled and reinstalled, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.
- I. Identify new and replacement materials and features with permanent marks hidden in the completed Work to distinguish them from original materials. Record a legend of identification marks and the locations of the items on record Drawings.

3.6 HISTORIC TREATMENT PROCEDURES

- A. The principal aim of preservation work is to halt the process of deterioration and stabilize the item's condition, unless otherwise indicated. Restoration work is to conform to the United States Secretary of the Interior's Standards for Rehabilitation, as administered by the National Park Service and the State Historic Commission. The following procedures shall be followed:
 - 1. Retain as much existing material as possible; repair and consolidate rather than replace.
 - 2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
 - 3. Use reversible processes wherever possible.
 - 4. Use traditional replacement materials and techniques. New work shall be distinguishable to the trained eye, on close inspection, from old work.
 - 5. Replicate existing profiles to the greatest extent possible.
 - 6. Match existing mortars in terms of color, joint profile, texture, width, etc.
- B. Prohibit smoking by personnel performing work on or near historic structures.
- C. Obtain Architect's review and written approval in the form of a Constructive Change Directive or Supplemental Instruction before making changes or additions to construction or removing historic materials.
- D. Notify Architect of visible changes in the integrity of material or components whether due to environmental causes including biological attack, UV degradation, freezing, or thawing; or due to structural defects including cracks, movement, or distortion.
 - 1. Do not proceed with the work in question until directed by Architect.
- E. Where missing features are indicated to be repaired or replaced, provide features whose designs are based on accurate duplications rather than on conjectural designs, subject to the approval of Architect.
- F. Where Work requires existing features to be removed, cleaned, and reused, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.
- G. Identify new or replacement materials and features with inconspicuous, permanent marks to distinguish them from original materials. Record the legend of identification marks and the locations of these marks on Record Drawings.
- H. When cleaning, match samples of existing materials that have been cleaned and identified for acceptable cleaning levels. Avoid over cleaning to prevent damage to existing materials during cleaning.

3.7 HISTORIC REMOVAL AND DISMANTLING

- A. General: Have removal and dismantling work performed by a qualified specialist. Ensure that field supervisors are present when removal and dismantling work begins and during its progress.
- B. Perform work according to the historic treatment program and approved mockup(s).
 - 1. Provide supports or reinforcement for existing construction that becomes temporarily weakened by the work, until the work is completed.
 - 2. Perform cutting by hand or with small power tools wherever possible. Cut holes and slots neatly to size required, with minimum disturbance of adjacent work.

3. Do not operate air compressors inside building, unless approved by Architect.
 4. Do not drill or cut columns, beams, joints, girders, structural slabs, or other structural supporting elements, without having Contractor's professional engineer's written approval for each location before such work is begun.
- C. Water-Mist Sprinkling: Use water-mist sprinkling and other wet methods to control dust only with adequate, approved procedures and equipment that ensure that such water will not create a hazard or adversely affect other building areas or materials.
- D. Unacceptable Equipment: Keep equipment that is not permitted for historic removal or dismantling work away from the vicinity where such work is being performed.
1. Large air hammers and cutting torches are not permitted.
 2. Light jackhammers are allowed, subject to Architect's approval.
 3. Pry bars more than eighteen 18-inches long and hammers weighing more than two (2) pounds are not permitted for dismantling work.
- E. Removing and Dismantling Items On or Near Historic Surfaces:
1. Use only hand-held tools, dismantling tools and procedures within 12-inches of surface.
 2. Protect historic surface from contact with or damage by tools. Tools must be adjustable so as to penetrate or cut only the thickness of material being removed.
 3. Unfasten items to be removed, in the opposite order from which they were installed.
 4. Support each item as it becomes loosened to prevent damage to the adjacent surface.
 5. Dismantle anchorages.
- F. Masonry Walls:
1. Remove masonry carefully and erect temporary bracing and supports as needed to prevent collapse of materials being removed.
 2. Dismantle top edge and sides before removing wall. Stop removal work and immediately inform Architect if any structural elements above or adjacent to the work show signs of distress or dislocation during any phase of removal work.
 3. Remove wall in easily managed pieces.
 4. During removal, Contractor is responsible for the stability of the partially remaining wall. Notify Architect of the condition of temporary bracing for wall if work is temporarily stopped during the wall's removal.
 5. Coordinate with Division 04 Section "Maintenance of Masonry."
- G. Structural Steel:
1. Expose structural steel for examination by Architect and Contractor's professional engineer before proceeding with removal or dismantling.
 2. If distress in structure is apparent during performance of the work, stop removal or dismantling and take immediate precautionary measures to ensure safety of the structure. Inform Architect of the problem, steps taken; and proposed corrective actions.
 3. Brace and support structure being removed and remaining; during removal and dismantling.
 4. Concrete-Encased Steel: Where steel is known to be encased by concrete being removed, saw cut with blades that will cut no deeper than the thickness of the concrete cover with an adequate margin for error in the location of the steel. Isolate sections of concrete by saw cutting before beginning removal.
- H. Paint Removal: It is the intent to scrape and feather all painted surfaces scheduled to receive new paint in order to facilitate removal of all loose paint chips, dirt, and debris. It is desired that through this process, the "alligator effect" caused by the hard edges of remaining existing

adhered paint will be reduced by feathering. Feathering can be accomplished by wet sanding or with a HEPA-vacuum equipped power sander. Both options required compliance with all applicable mitigation and containment laws set forth in Division 02 Section "Environmental."

END OF SECTION 013591

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Commissioning Agent, Owner's Project Manager (OPM), or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
 - 1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Division 01 Section "Execution" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 3. Division 01 Section "Mock-Ups."
 - 4. Divisions 02 through 50 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five (5) previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

- D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
 - 1. Mockups are used for one or more of the following:
 - a. Verify selections made under Sample submittals.
 - b. Demonstrate aesthetic effects.
 - c. Demonstrate the qualities of products and workmanship.
 - d. Demonstrate successful installation of interfaces between components and systems.
 - e. Perform preconstruction testing to determine system performance.
 - 2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
 - 3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
 - E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
 - F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) in accordance with 29 CFR 1910.7, by a testing agency accredited in accordance with NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
 - G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
 - H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."
 - I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
 - J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect[**or Construction Manager**].
- 1.4 DELEGATED DESIGN SERVICES
- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products, systems, and third-party engineering complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
 - B. Delegated Design Services Statement: Submit an engineering analysis and a statement signed and sealed by the responsible third-party engineering design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional,

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

1.5 CONFLICTING REQUIREMENTS

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

1.6 ACTION SUBMITTALS

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

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.

6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

- F. Reports: Prepare and submit certified written reports and documents as specified.
- G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.8 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within fourteen (14) calendar days of Notice of Award, and not less than seven (7) calendar days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by Commissioning Agent.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.9 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, telephone number, and email address of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement of whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement of whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

1.10 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well

as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Third-Party Engineer Qualifications: A professional third-party engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
 - 1. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- 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's Responsibilities:
 - 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. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.

- f. Payment for preconstruction testing will be made by the Contractor.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, Owner, and Commissioning Agent, with copy to Contractor. Interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Refer to Division 01 Section "Mockups" for additional construction requirements.
 - 2. Build mockups of size indicated.
 - 3. Build mockups in location indicated or, if not indicated, as directed by Architect.
 - 4. Provide as required by individual specification Sections.
 - 5. Notify Architect and Owner seven (7) calendar in advance of dates and times when mockups will be constructed.
 - 6. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
 - 7. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 8. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
 - a. Allow seven (7) calendar days for initial review and each re-review of each mockup.
 - 9. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
 - 10. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 11. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 12. Demolish and remove mockups when directed unless otherwise indicated.

1.11 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
 - 2. Payment for these services will be made directly by the Owner.
 - 3. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor will not employ same entity engaged by Owner, unless agreed to in

writing by Owner unless agreed to in writing by Owner and OPM.

3. Furnish Owner and Architect with names, addresses and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 4. Notify Owner and testing agencies at least twenty-four (24) hours in advance of time when Work that requires testing or inspection will be performed.
 5. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 6. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 7. Submit additional copies of each written report directly to authorities having jurisdiction, when directed.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
1. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor and the Contract Sum will be adjusted by a deduct Change Order.
- D. Testing Agency Responsibilities: Cooperate with Architect, OPM, Owner, Commissioning Agent, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Owner, Commissioning Agent, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify Owner and agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.

3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Secure facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspection equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
 2. Distribution: Distribute schedule to Owner, Architect, OPM, Commissioning Agent, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.
- J. Testing Agency Required Tests: Including, but not limited to the following. Refer to Paragraph 1.12 "Special Inspections" below for additional requirements.
1. Verification of masonry anchors, ties, and reinforcement.
 2. Verification of wood structure connections.
 3. Verification of structural steel connections (welds and bolts).
 4. Verification of metal deck connections.

1.12 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Engage a qualified testing agency to act as the special inspector to conduct special tests and inspections required by the Engineer of Record's Statement of Special Inspections and as required by authorities having jurisdiction, in accordance with the State Building Code in which the project is located, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect, Owner, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, Owner, with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected Work.
- B. Refer to the "Statement of Special Inspections" prepared by the Structural Engineer, if provided.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

3.2 REPAIR AND PROTECTION

- A. General: Upon completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

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 DEFINITIONS

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

1.3 INDUSTRY STANDARDS

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

- 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.

1.4 ABBREVIATIONS AND ACRONYMS

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

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

31. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (see ASCE).
32. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
33. ASME - ASME International; American Society of Mechanical Engineers (The); www.asme.org.
34. ASSE - ASSE International; (American Society of Sanitary Engineering); www.asse-plumbing.org.
35. ASSP - American Society of Safety Professionals; www.assp.org.
36. ASTM - ASTM International; www.astm.org.
37. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
38. AVIXA - Audiovisual and Integrated Experience Association; www.avixa.org.
39. AWI - Architectural Woodwork Institute; www.awinet.org.
40. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
41. AWWA - American Water Works Association; www.awwa.org.
42. AWS - American Welding Society; www.aws.org.
43. AWWA - American Water Works Association; www.awwa.org.
44. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
45. BIA - Brick Industry Association (The); www.gobrick.com.
46. BICSI - BICSI, Inc.; www.bicsi.org.
47. BIFMA - Business and Institutional Furniture Manufacturer's Association; www.bifma.org.
48. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
49. BWF - Badminton World Federation; www.bwfbadminton.com.
50. CARB - California Air Resources Board; www.arb.ca.gov.
51. CDA - Copper Development Association Inc.; www.copper.org.
52. CE - Conformite Europeenne (European Commission); www.ec.europa.eu/growth/single-market/ce-marking.
53. CEA - Canadian Electricity Association; www.electricity.ca.
54. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
55. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
56. CGA - Compressed Gas Association; www.cganet.com.
57. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
58. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
59. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
60. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
61. CPA - Composite Panel Association; www.compositepanel.org.
62. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
63. CRRC - Cool Roof Rating Council; www.coolroofs.org.
64. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
65. CSA - CSA Group; www.csagroup.org.
66. CSI - Cast Stone Institute; www.caststone.org.
67. CSI - Construction Specifications Institute (The); www.csiresources.org.
68. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
69. CTA - Consumer Technology Association; www.cta.tech.
70. CTI - Cooling Technology Institute; www.coolingtechnology.org.
71. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
72. DHA - Decorative Hardwoods Association; www.decorativehardwoods.org.
73. DHI - Door and Hardware Institute; www.dhi.org.
74. ECIA - Electronic Components Industry Association; www.ecianow.org.
75. EIMA - EIFS Industry Members Association; www.eima.com.
76. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
77. EOS/ESD - EOS/ESD Association, Inc.; Electrostatic Discharge Association; www.esda.org.

78. ESTA - Entertainment Services and Technology Association; www.esta.org.
79. EVO - Efficiency Valuation Organization; www.evo-world.org.
80. FCI - Fluid Controls Institute; www.fluidcontrolsintitute.org.
81. FGIA - Fenestration and Glazing Industry Alliance; <https://fgiaonline.org>.
82. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
83. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
84. FM Approvals - FM Approvals LLC; www.fmapprovals.com.
85. FM Global - FM Global; www.fmglobal.com.
86. FRSA - Florida Roofing and Sheet Metal Contractors Association, Inc.; www.floridarooft.com.
87. FSA - Fluid Sealing Association; www.fluidsealing.com.
88. FSC - Forest Stewardship Council U.S.; www.fscus.org.
89. GA - Gypsum Association; www.gypsum.org.
90. GS - Green Seal; www.greenseal.org.
91. HI - Hydraulic Institute; www.pumps.org.
92. HMMA - Hollow Metal Manufacturers Association; (see NAAMM).
93. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
94. IAS - International Accreditation Service; www.iasonline.org.
95. ICC - International Code Council; www.iccsafe.org.
96. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
97. ICPA - International Cast Polymer Association (The); www.theicpa.com.
98. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
99. IEC - International Electrotechnical Commission; www.iec.ch.
100. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
101. IES - Illuminating Engineering Society; www.ies.org.
102. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
103. IGMA - Insulating Glass Manufacturers Alliance; (see FGIA).
104. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.org.
105. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
106. Intertek - Intertek Group; www.intertek.com.
107. ISA - International Society of Automation (The); www.isa.org.
108. ISFA - International Surface Fabricators Association; www.isfanow.org.
109. ISO - International Organization for Standardization; www.iso.org.
110. ITU - International Telecommunication Union; www.itu.int.
111. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
112. LPI - Lightning Protection Institute; www.lightning.org.
113. MBMA - Metal Building Manufacturers Association; www.mbma.com.
114. MCA - Metal Construction Association; www.metalconstruction.org.
115. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
116. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
117. MHI - Material Handling Industry; www.mhi.org.
118. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
119. MPI - Master Painters Institute; www.paintinfo.com.
120. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry, Inc.; www.msshq.org.
121. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
122. NACE - NACE International; (National Association of Corrosion Engineers International); (see AMPP).
123. NADCA - National Air Duct Cleaners Association; www.nadca.com.
124. NAIMA - North American Insulation Manufacturers Association; www.insulationinstitute.org.
125. NALP - National Association of Landscape Professionals;

- www.landscapeprofessionals.org.
126. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
 127. NBI - New Buildings Institute; www.newbuildings.org.
 128. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
 129. NCMA - National Concrete Masonry Association; www.ncma.org.
 130. NEBB - National Environmental Balancing Bureau; www.nebb.org.
 131. NECA - National Electrical Contractors Association; www.necanet.org.
 132. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
 133. NEMA - National Electrical Manufacturers Association; www.nema.org.
 134. NETA - InterNational Electrical Testing Association; www.netaworld.org.
 135. NFHS - National Federation of State High School Associations; www.nfhs.org.
 136. NFPA - National Fire Protection Association; www.nfpa.org.
 137. NFPA - NFPA International; (see NFPA).
 138. NFRC - National Fenestration Rating Council; www.nfrc.org.
 139. NGA - National Glass Association; www.glass.org.
 140. NHLA - National Hardwood Lumber Association; www.nhla.com.
 141. NLGA - National Lumber Grades Authority; www.nlga.org.
 142. NOFMA - National Oak Flooring Manufacturers Association; (see NWFA).
 143. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
 144. NRCA - National Roofing Contractors Association; www.nrca.net.
 145. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
 146. NSF - NSF International; www.nsf.org.
 147. NSI - Natural Stone Institute; www.naturalstoneinstitute.org.
 148. NSPE - National Society of Professional Engineers; www.nspe.org.
 149. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
 150. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
 151. NWFA - National Wood Flooring Association; www.nwfa.org.
 152. NWRA - National Waste & Recycling Association; www.wasterecycling.org.
 153. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
 154. PDI - Plumbing & Drainage Institute; www.pdionline.org.
 155. PLASA - PLASA; www.plasa.org.
 156. PLIB - Pacific Lumber Inspection Bureau; www.plib.org.
 157. PVCPA - Uni-Bell PVC Pipe Association; www.uni-bell.org.
 158. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
 159. RFCI - Resilient Floor Covering Institute; www.rfci.com.
 160. RIS - Redwood Inspection Service; (see WWPA).
 161. SAE - SAE International; www.sae.org.
 162. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
 163. SDI - Steel Deck Institute; www.sdi.org.
 164. SDI - Steel Door Institute; www.steeldoor.org.
 165. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
 166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (see ASCE).
 167. SIA - Security Industry Association; www.securityindustry.org.
 168. SJI - Steel Joist Institute; www.steeljoist.org.
 169. SMA - Screen Manufacturers Association; www.smainfo.org.
 170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
 171. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
 172. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
 173. SPIB - Southern Pine Inspection Bureau; www.spib.org.
 174. SPRI - Single Ply Roofing Industry; www.spri.org.
 175. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
 176. SSINA - Specialty Steel Industry of North America; www.ssina.com.

177. SSPC - SSPC: The Society for Protective Coatings; (see AMPP).
178. STI/SPFA - Steel Tank Institute/Steel Plate Fabricators Association; www.steeltank.com.
179. SWI - Steel Window Institute; www.steelwindows.com.
180. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
181. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
182. TCNA - Tile Council of North America, Inc.; www.tcnatile.com.
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.kbcdco.tema.org.
184. TIA - Telecommunications Industry Association (The); www.tiaonline.org.
185. TMS - The Masonry Society; www.masonrysociety.org.
186. TPI - Truss Plate Institute; www.tpinst.org.
187. TPI - Turfgrass Producers International; www.turfgrasssod.org.
188. TRI - Tile Roofing Industry Alliance; www.tilerroofing.org.
189. UL - Underwriters Laboratories Inc.; www.ul.org.
190. UL LLC - UL LLC; www.ul.com.
191. USAV - USA Volleyball; www.usavolleyball.org.
192. USGBC - U.S. Green Building Council; www.usgbc.org.
193. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
194. WA - Wallcoverings Association; www.wallcoverings.org.
195. WCLIB - West Coast Lumber Inspection Bureau; (see PLIB).
196. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
197. WDMA - Window & Door Manufacturers Association; www.wdma.com.
198. WI - Woodwork Institute; www.woodworkinstitute.com.
199. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
200. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. CPSC - U.S. Consumer Product Safety Commission; www.cpsc.gov.
2. DOC - U.S. Department of Commerce; www.commerce.gov.
3. DOD - U.S. Department of Defense; www.defense.gov.
4. DOE - U.S. Department of Energy; www.energy.gov.
5. DOJ - U.S. Department of Justice; www.ojp.usdoj.gov.
6. DOS - U.S. Department of State; www.state.gov.
7. EPA - United States Environmental Protection Agency; www.epa.gov.
8. FAA - Federal Aviation Administration; www.faa.gov.
9. GPO - U.S. Government Publishing Office; www.gpo.gov.
10. GSA - U.S. General Services Administration; www.gsa.gov.
11. HUD - U.S. Department of Housing and Urban Development; www.hud.gov.
12. LBNL - Lawrence Berkeley National Laboratory; Energy Technologies Area; www.lbl.gov/.
13. NIST - National Institute of Standards and Technology; www.nist.gov.
14. OSHA - Occupational Safety & Health Administration; www.osha.gov.
15. TRB - Transportation Research Board; National Cooperative Highway Research

- Program; The National Academies; www.trb.org.
16. USACE - U.S. Army Corps of Engineers; www.usace.army.mil.
 17. USDA - U.S. Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
 18. USDA - U.S. Department of Agriculture; Rural Utilities Service; www.usda.gov.
 19. USP - U.S. Pharmacopeial Convention; www.usp.org.
 20. USPS - United States Postal Service; www.usps.com.
- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to 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 U.S. Government Publishing Office; www.govinfo.gov.
 2. DOD - U.S. Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.dsp.dla.mil/Specs-Standards/.
 3. DSCC - Defense Supply Center Columbus; (see FS).
 4. FED-STD - Federal Standard; (see FS).
 5. FS - Federal Specification; Available from DLA Document Services; www.dsp.dla.mil/Specs-Standards/.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from U.S. General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
 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).
- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they are to mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. BEARHFTI; California Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; (see BHGS).
 2. BHGS; State of California Bureau of Household Goods and Services; (Formerly: California Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation); www.bhgs.dca.ca.gov.
 3. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.oal.ca.gov/publications/ccr/.
 4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cdph.ca.gov/Programs/CCDCPD/DEOD/EAHBP/IAQ/Pages/Main-Page.aspx.
 5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
 6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
 7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; <https://tfsweb.tamu.edu/>.

DBVW Architects, Inc.
Project No. 2417
Issued for Bid

Providence City Hall Exterior Restoration, Phase I
Providence, Rhode Island
March 11, 2026

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 014339 - MOCKUPS

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. General: Provide and coordinate mock-up assemblies at Project site for Architect and Owner's review and acceptance, in accordance with requirements of the Contract Documents. Mock-ups include the following:
 - 1. Exterior mockups.
 - 2. Mock-ups of individual Work or representative assemblies incorporated into the Work, as specified within individual Specification Sections.
- B. Related Requirements:
 - 1. Division 01 Section "Quality Requirements" for quality assurance requirements for aesthetic and workmanship mockups specified in other Sections.
 - 1. Examine Contract Documents for requirements that affect Work of this Section. Refer to individual Specification Sections that specify field mock-ups of individual pieces of the Work and of exterior building enclosure Work.

1.3 DEFINITIONS

- A. Exterior Mockups: Mockups of the exterior envelope constructed on-site as either freestanding temporary built elements and/or part of permanent construction, consisting of multiple products, assemblies, and subassemblies. Refer to Architectural Drawings and individual Specification Sections for requirements.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Owner's Project Manager, Architect, testing and inspecting agency representative, and installers of major systems whose Work is included in mockups.
 - 2. Review locations and extent of mockups.
 - 3. Review testing procedures, if required to be performed on mockups.
 - 4. Review and finalize schedule for mockups, and verify availability of materials, personnel, equipment, and facilities needed to complete mockups and maintain schedule for the Work.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For mockups.
 - 1. Include plans, elevations, sections, and mounting, attachment, and support details.
 - 2. Indicate manufacturer and model number of individual components, subassemblies, and

- assemblies.
 - 3. Include site location drawing indicating orientation of mockup(s).
 - 4. Revise and resubmit Shop Drawings to reflect approved modifications in details and component interfaces resulting from changes made during testing procedures.
- B. Delegated Design Submittal: For temporary structural supports for mockups not attached to building structure, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Photographs of Mock-Ups: Submit photographs of mock-ups after completion of installation and acceptance of each mock-up.
- D. Samples: Refer to individual Specification Sections for submittal requirements of mock-up components and coordinate accordingly.

1.6 QUALITY ASSURANCE

- A. Build mockups to do the following:
- 1. Verify selections made under Sample submittals.
 - 2. Demonstrate aesthetic effects.
 - 3. Demonstrate the qualities of products and workmanship.
 - 4. Demonstrate acceptable coordination between components and systems.
- B. Fabrication: Before fabricating or installing portions of the Work requiring mockups, build mockups for each form of construction and finish required. Use materials and installation methods as required for the Work.
- 1. Build mockups of size indicated.
 - 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
 - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed unless otherwise indicated.
- C. Notifications:
- 1. Notify Architect and Owner a minimum of seven (7) calendar days in advance of the dates and times when mockups will be constructed.
 - 2. Allow five (5) business days for initial review and each re-review of each mockup.
- D. Approval: Obtain Architect's approval of mockups before starting fabrication or construction of corresponding Work.
- 1. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 2. Provide as many mock-ups as required until Architect's approval has been received.
 - 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. Protect and maintain approved mock-ups throughout the work of the Contract.
 - 5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- E. If not permanently incorporated into the final Work, demolish and remove mock-ups from site at the completion of the Project and legally dispose of demolished mock-up materials.

1.7 COORDINATION

- A. Coordinate schedule for construction of mockups, so construction, testing, and review of mockups do not impact Project schedule.

PART 2 - PRODUCTS

2.1 MATERIALS AND PRODUCTS

- A. Provide materials, components, and products for mock-up(s) as specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 GENERAL

- A. Refer to PART 3, EXECUTION portions of the various Specification Sections for specific requirements regarding condition of surfaces, erection, and erection tolerances.

3.2 SCHEDULE

- A. Provide mock-ups of types and sizes required by individual Specification Sections and Drawings to evaluate and set the standard of quality for that work.
 - 1. **Provide complete, full-size, typical roof construction mockups for all roofing systems, cladding profiles, and transitions**, in locations as agreed upon by the Owner, Owner's Project Manager, Architect, and Contractor.
 - a. Refer to Drawings and Specifications. Coordinate with Division 06 and Division 07 Sections.
 - b. Mock-ups will be reviewed and approved in various stages.

END OF SECTION 014339

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
 - 1. Temporary utilities required include but are not limited to HVAC; water service and distribution; electric service, power distribution, and lighting; telephone service; and storm drainage.
 - 2. Temporary support facilities include but are not limited to field offices, storage containers, sanitary facilities, drinking water, dewatering facilities, and drains; temporary enclosures, hoists and man lifts; temporary signs, waste disposal services, rodent and pest control, construction aids, and miscellaneous services and facilities, scaffolding, temporary roads and walks; and tire cleaning surface.
 - 3. Security and protection facilities include but are not limited to temporary fire protection, barricades, warning signs and lights; temporary site fence; environmental protection, traffic control as required at walks and streets; and fire watches.
- B. Related Requirements:
 - 1. Division 00 Section "Environmental" for hazardous material abatement.
 - 2. Division 01 Section "Summary" for Work restrictions and utility interruptions.
 - 3. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule, and utility reports.
 - 4. Division 01 Section "Indoor Air Quality Management Plan" for monitoring and maintaining indoor air quality during and after construction.
 - 5. Division 01 Section "Photographic Documentation" for preconstruction photographs.
 - 6. Division 01 Section "Execution" for progress cleaning requirements.
 - 7. Divisions 02 through 50 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.
- C. For additional information, refer to Architectural Drawings for site plans.

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 UTILITIES AND USE CHARGES

- A. General: Installation, removal, use charges, taxes, surcharges, and fees for temporary utilities shall be paid for by the General Contractor and included in the Base Bid Contract Sum unless explicitly stated otherwise in the Contract Documents. Coordinate with local utility companies

and Owner. Allow other entities engaged in the Project to use temporary utility services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

- B. Sewer Service: None required.
- C. Water Service:
 - 1. Water supply is available from the existing building.
- D. Electric Power Service:
 - 1. Electrical service is available from the existing building.
 - 2. General Contractor shall engage the electrical sub-contractor to provide temporary power service, poles, meters, and panels for field offices, and extensions and connections required for temporary lighting, power, other construction operations, and equipment not defined as "small tools."

1.5 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, storage containers, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within fifteen (15) calendar days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Erosion and Sedimentation-Control Plan: Show compliance with requirements of Construction Permit, State, and Local authorities having jurisdiction.
- E. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- F. Moisture and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
 - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
 - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 - 3. Indicate methods to be used to avoid trapping water in finished work.
 - 4. Indicate methods for delivery, handling, and storage provisions for materials subject to water absorption or water damage.
- G. Dust and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the

dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste-handling procedures.
5. Other dust-control measures.
6. Identify further options if proposed measures are later determined to be inadequate.

H. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by Owner. Include the following:

1. Methods used to meet the goals and requirements of the OPM and Owner.
2. Concrete cutting method(s) to be used.
3. Location of construction devices on the site.
4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with OPM and Owner.
6. Indicate locations of sensitive areas or other areas requiring special attention as identified by the OPM and Owner. Indicate means for complying with Owner's requirements.

1.6 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to Building and Fire Code requirements, health and safety regulations, utility company and state regulations, police and fire department rules and environmental protection regulations.
- B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", OSHA Part 1926, Construction Safety and Health Regulations, and NECA Electrical Design Library "Temporary Electrical Facilities."
1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.
 2. All temporary electrical work shall meet the requirements of the State Building Code, the Local Utility Company and all Federal Standards and Laws.
- C. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- D. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits. All associated costs are the responsibility of the Contractor.
- E. Accessible Temporary Egress: Comply with applicable provisions in the DOJ's "2010 ADA Standards for Accessible Design," and State Regulations.

1.7 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Contractor shall 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.

- B. Conditions of Use: Contractor shall keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions or public nuisances to develop or persist on the site.
- C. Prevention of Fire: Contractor shall take all necessary precautions for the prevention of fire during construction. Keep the area within the contract limits orderly and clean and promptly remove combustible rubbish from the site. Comply with all suggestions, official recommendations and lawful requirements of the local fire department and state fire marshal regarding fire protection.
 - 1. Workers performing "hot work" must complete the NFPA 58 Hot Work Safety Certificate Online Training and provide documentation to OPM and Owner as requested.
- D. General Contractor shall provide and maintain all temporary fencing, barriers, protection/prevention materials and equipment, hay bales, soil and erosion control and dust control required for this Project. Conform with all applicable laws and regulations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials, suitable for the use intended.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch thick, galvanized steel, chain-link fabric fencing; minimum 6-feet high panels with galvanized steel pipe posts, and top and bottom rails. Include galvanized steel clips and ties to secure panels to each other. Include full height privacy screen at all fencing and gates. Provide pre-cast concrete bases for supporting posts. Include locks at all gates; and provide keys to the Owner and Fire Department.
 - 1. Coordinate layout and locations with Owner in the field.
- C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.
- D. Lumber and Plywood: Comply with requirements in Division 06 Section "Rough Carpentry."
 - 1. For signs and directory boards, provide exterior type, Grade B-B high density concrete form overlay plywood conforming to PS-1, of sizes and thickness indicated.
 - 2. For temporary enclosures, barriers, sidewalk bridges and similar uses; provide 3/4-inch-thick exterior plywood.
- E. Gypsum Board: 5/8-inch thick by 48-inches wide by maximum available lengths; Type X panels with tapered edges. Comply with requirements of ASTM C36 on interior temporary partitions.
- F. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

- G. Paint: Comply with requirements in Division 09 Section "Painting."
- H. Tarpaulins: Provide waterproof, fire resistant, UL labeled tarpaulins with flame spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.
- I. Water: Provide potable water approved by local health authorities.
- J. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60-inches.
- K. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices: Coordinate with Owner for use of building or site for Contractor's field office.
- B. Maintenance: Provide cleaning services and trash removal of the field offices on a weekly basis.
- C. Sanitary Facilities: Provide exterior, self-contained, single-occupant toilet units of the chemical type, properly ventilated, and fully enclosed with a glass-fiber reinforced polyester shell or equal. Provide one unit for each twenty-five (25) personnel on-site; but not less than two (2) units at a minimum when actual personnel count on-site is less than fifty (50). Coordinate final number with authorities having jurisdiction.
- D. Storage and Fabrication Sheds: Provide sheds or containers sized, furnished, and equipped to accommodate materials and equipment for construction operations. Store combustible materials apart from buildings.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. General: Provide new equipment, suitable for use intended.
- B. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures. Comply with NFPA 10 and 241.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

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

3.2 INSTALLATION, GENERAL

- A. Use qualified personnel for installation of temporary facilities.
- B. 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 Division 01 Section "Summary."
- C. 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.
- D. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Prior to commencing work, the Contractor shall engage the Mechanical subcontractor to isolate the HVAC system in area where work is to be performed.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 - 2. General Contractor shall maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 - 3. General Contractor shall perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: The General Contractor shall install temporary services or connect to and/or modify existing services.
 - 1. Engage the appropriate local utility company to install temporary services. Where the company provides only part of the service, provide the remainder with matching, compatible materials, and equipment; comply with the company's recommendations.
 - 2. Arrange with utility company, Town/City/State, Owner, OPM, and existing users (when applicable) for time when service can be interrupted, if necessary, to make connections for temporary services.
 - 3. Pay all installation, monthly service charges and removal charges; include in Base Bid unless otherwise indicated.
 - 4. Provide all temporary lighting and power required during working hours of the project.
- B. Sewers and Drainage: The General Contractor shall provide temporary utilities to lawfully remove effluent and storm drainage.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
 - 2. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog or pollute waterways before discharge.
 - 3. Provide SWPPP and all required notifications.
- C. Water Service:

1. The General Contractor shall connect to Owner's existing water service facilities. Provide an insulated, weather-resistant enclosure, as well as temporary heat during cold weather, to the satisfaction of the Town/City. Provide heat necessary to prevent water from freezing.
 2. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Sanitary Facilities: The General Contractor may provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities. Refer to Paragraph 2.2.E above.
1. Use of Permanent Toilets: Public restrooms are located inside the building during the building's operating hours and are available for use.
- E. Temporary Heating, Cooling, Ventilation, and Humidity Control: The General Contractor shall provide temporary heating, cooling, ventilation, and humidity control as 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. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
1. Provide temporary heating during the months of October through April.
 2. Provide temporary cooling during the months of June through August.
 3. Ventilation and humidity control will be required throughout the duration of the Project to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
 4. The General Contractor is responsible to furnish and pay for all temporary heating, cooling, ventilation, and humidity control required for the duration of the Project.
 5. Maintain a minimum temperature of 50 deg F in all interior locations, except as specifically required by other Specification Sections where higher temperature must be maintained for installation and curing of finishes. Each Subcontractor that requires additional temporary heat shall pay General Contractor for such additional heat.
 6. Provide an accurate, non-recording, reading thermometer for every 2,000 square feet of floor space. Coordinate locations with Owner's Project Manager and Architect.
 7. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- F. Electric Power Service: The General Contractor shall engage the electrical subcontractor to provide the temporary electric service and distribution system of sufficient size, capacity and power characteristics required for Field Offices, construction operations and as required to maintain services to the existing and adjacent buildings in the complex to remain in use. Refer to Paragraph 1.4.D above.
1. Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
 2. Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - a. Install electric power service overhead unless otherwise indicated.
 - b. Connect temporary service to Owner's existing power source, as directed by Owner.
 3. Install overhead electric power service for the prefabricated trailers.
 - a. Include poles, meters, transformers, overload protected disconnects, automatic ground-fault interrupters and switch gear.
 4. Furnish extensions of lines to sheds or remote areas which cannot be reached with

extension cords.

- G. Lighting: The General Contractor shall engage the electrical subcontractor to provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions. Refer to Paragraph 2.3.C.4 above. Maintenance or improvements required for safety or code compliance, if needed in an existing building, shall be the responsibility of the electrical subcontractor.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 2. Include lighting in all areas of the building which are part of the Work, including basements, attics, and crawlspaces.
 3. Night Lighting: Provide adequate outdoor lighting to illuminate security zones, staging, stockpiles, trenches, projections, and the like, with the intent of protecting the materials and construction from damage, vandalism and to protect the public from injury.

3.4 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
1. Provide non-combustible construction for offices, shops and containers located within the construction area, or within 30 feet of existing building, in accordance with ASTM E136. 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.
 3. Confine apparatus, materials, equipment, supplies and operations to the areas bounded by the Contract and as coordinated with the OPM and Owner.
 4. Locate field offices, storage containers, sanitary facilities, and other temporary construction and support facilities for easy access.
 5. Refer to and comply with the Architectural Site Plan.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
 3. Provide clear signage to mark all construction traffic and deliveries.
 4. Make all necessary arrangements and pay for the services of police officers and firefighters at the prevailing wage for such services as may be required for traffic control or fire watch for the performance of any portion of the Work.
 5. The Contractor shall provide all necessary traffic control equipment, including but not limited to signage, barricades, and cones. All equipment to comply with Town/City in which the Project is located and the State Department of Transportation Work Zone Safety Standards.
- C. Parking: Parking will not be provided for construction personnel.
- D. Storage and Staging: Use designated areas of Project site for storage and staging needs. Coordinate with Owner.
- 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 from any portion of the site and building for which a Certificate of Substantial Completion has not been issued.
- F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Project Identification Sign: Provide one (1) sign as indicated on Drawings.
 - a. Size: 4-feet H. by 8-feet L.
 - b. Construction: 3/4-inch-thick plywood framed with 2x4 nominal center cross bracing, and two (2) 4 x 4 nominal posts. Mount sign to framing with four (4) 3/8-inch diameter galvanized lug bolts and washers on each side of the sign.
 - c. Location: As directed in field by OPM and Owner.
 - d. Architect will supply actual graphics for Contractor use.
 2. Temporary Signs: Provide signs as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 3. Maintain and touch up signs, so they are legible at all times.
 4. Support all signs on temporary pressure treated wood posts secured into the ground to provide a minimum of 4-feet embedment. Provide 12-inch diameter fiber form foundations at Project Identification signs.
- G. Waste Disposal Facilities and Procedures:
1. The General Contractor shall comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
 2. The General Contractor shall provide waste-collection containers in sizes adequate to handle waste from construction operations.
 - a. Collect waste from construction areas daily.
 - b. Dispose of material in a lawful manner.
 - c. Permit use of dumpsters by work of other contracts and Owner.
 - d. Provide additional dumpsters for use by Owner's FF&E Vendors
 - e. Comply with requirements of authorities having jurisdiction.
 - f. Locate containers / dumpsters within the Contract limits.
 3. Comply with progress cleaning requirements in Division 01 Section "Execution."
 - a. Do not pass materials through openings and surrounding construction unless openings are adequately protected from damage.
 - b. Do not hold materials more than seven (7) calendar days during normal weather or three (3) calendar days when the temperature is expected to rise above 80 deg F.
 4. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly.
- H. Lifts, Hoists, and Cranes: The General Contractor shall provide, operate, and maintain facilities necessary for hoisting materials, equipment, and rubbish to carry out the Work.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
 2. Truck cranes, forklifts, man lifts, and similar devices required for the performance of Work by sub-contractor Sections shall be provided by the sub-contractor.
 3. Comply with the most stringent of all applicable Federal (including OSHA), state and local laws, rules, regulations, codes and ordinances and other provisions of Division 01 Specification Sections.
- I. Existing Elevator Use and Roof Access:

1. **The Contractor is responsible for providing access to all areas of work from the exterior for personnel and materials.**
 2. Use of Owner's existing elevators and roof access routes will be permitted for occasional access by personnel only, as necessary for coordination purposes and during mobilization.
 3. The existing elevators and roof access shall not be used for transporting material.
- J. Temporary Stairs: Provide temporary stairs where ladders are not adequate.
- K. Existing Stair and Ramp Usage: Use of Owner's existing stairs and ramps will be permitted as authorized by Owner, provided they are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore to condition existing before initial use.
1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and/or ramps, and to maintain means of egress. If items become damaged, restore damaged areas, so no evidence remains of correction work.
 2. **The existing stairs to the roofs shall not be used as the primary means of access to the work areas and shall not be used for material delivery. Refer to the Drawings for additional information.**
- L. Temporary Stairs, Ladders, Ramps, Platforms, Etc.: The General Contractor shall provide, operate, and maintain in safe operating order for the proper execution of the Work.
1. Comply with the most stringent of all applicable Federal (including OSHA), state and local laws, rules, regulations, codes, ordinances, and provisions of Division 01.
 2. Coordinate erection, maintenance and removal of all temporary stairs, ladders, platforms bridging, and other temporary construction furnished by Subcontractors.
- M. Staging and Scaffolding: Where staging and scaffolding is required, the General Contractor shall provide the entire installation; including labor, materials, tools, appliances, and engineering services. The General Contractor shall be responsible for coordinating the placement and scheduling of all staging and scaffolding. Staging shall be of approved design, erected and removed by experienced stage builders and shall have all accident prevention devices required by Federal, State, and local laws.
1. **Refer the Drawings for information regarding load distribution on the existing sidewalks adjacent to the building.**
 2. Provide and erect access staging and/or mechanical lift as required to provide a work platform for all trades for Work around the building. Staging shall extend vertically from grade to the highest roof edge, parapet, chimney, or other building element.
 3. Provide security fencing to secure the base of all staging against unauthorized access. Security fencing shall extend at least 8-feet high around the entire perimeter of the staging system to prevent unauthorized use of the staging. Security staging shall be of a kind that prohibits climbing and is unable to be spray-painted or vandalized.
 4. **Building entrances and egress paths must be maintained at all times.**
 5. All access equipment shall be erected using extreme care to avoid any damage to the building. The Masonry Subcontractor shall infill all holes remaining in masonry upon removal of scaffolding anchors.
 6. The General Contractor shall exercise proper precautions at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a fault of his negligence in connection with the execution of the work. All safety provisions of applicable laws and the building and construction codes shall be observed.
 7. The General Contractor shall provide solid continuous platforms as required by all trades performing work under this contract.

- N. Recondition site after temporary use.
- O. Window Removal and Opening Protection: Provide building protection where necessary to deliver or remove materials/debris through openings. The General Contractor is responsible for all costs for removing windows and/or doors, opening protection; and for cleaning and repairing damage resulting from such operations.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Division 01 Section "Summary."
 - 2. Comply with indoor air quality construction plan requirements specified in Division 01 Section "Indoor Air Quality Construction Plan."
- C. 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.
- D. Animal Control: The Contractor shall provide pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction using environmentally safe materials.
 - 1. Notify Owner if nesting animals are identified prior to selective demolition and at any point during construction.
- E. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined by Owner to be sufficient to accommodate construction operations.
 - 2. Provide man and vehicle gates at site entrances.
 - 3. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish Owner and their representatives each with one set of keys.
 - 4. Make all necessary arrangements when regular or off-duty police officers will be needed for traffic control for site operations.
- F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

- H. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- I. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
 - 1. Construct covered walkways using scaffold or shoring framing.
 - 2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 - 3. Paint and maintain appearance of walkway for duration of the Work.
- J. 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 to allow work to continue in accordance with the Construction Documents. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 - 2. Install tarpaulins securely, with fire-retardant-treated wood framing and other materials.
 - 3. Close openings of 25 square feet or less with plywood or similar materials.
 - 4. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
 - 5. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fire-retardant treated materials for framing and main sheathing.
 - 6. Do not use new permanent doors and frames for temporary enclosures until finishing work is begun, and then only if carefully protected from damage. Prior to installation of permanent doors and frames, provide temporary wood, plywood, or hollow metal doors with wood or hollow metal frames and proper hardware to make the doors self-closing. Close and lock all openings accessible from ground level at end of each day's work to prevent entry of unauthorized persons.
- K. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
 - 1. Construct dustproof partitions with gypsum wallboard, with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
 - 2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 - 3. Insulate partitions to control noise transmission to occupied areas.
 - 4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - 5. Protect air-handling equipment.
 - 6. Provide walk-off mats at each entrance through temporary partition.
- L. Protection: Protect the Work at all times from damage. Provide all pumps, equipment, and enclosures to ensure this protection.
 - 1. Provide all shoring, bracing, and sheeting as required for safety and proper execution of the Work. Maintain in accordance with requirements of Contractor's engineer of record.
 - 2. Restore or replace all surfaces that are damaged by operations under this Contract to their original condition, to the satisfaction of the Owner and Architect, at no additional expense to the Owner.

3. Remove snow and ice to ensure proper protection and execution of the Work.
4. Protect all work from damage during cold weather. If low temperatures make it impossible to continue operations safely in spite of cold weather precautions, cease work and so notify Architect and Owner. Repair and/or replacement of all work damaged from frost, freezing or any elements of the weather are the responsibility of the Contractor.
5. Should high wind warnings be issued by the National Weather Service (NOAA), take every precaution to minimize danger to persons, to the Work, and to adjacent properties, including, but not limited to, removing all loose materials, tools and/or equipment from exposed locations, and removing or securing scaffolding or other temporary work.
6. Do not load, or allow any part of the structure to be loaded with a weight that will endanger its safety or the safety of personnel operating in or around the premises.
7. Protect the building and the site from damage, loss, or liability due to theft or vandalism when the work is not in progress at night, weekends, or holidays.
8. Exercise precaution for the protection of persons and property at all times. Observe the provisions of applicable laws and construction codes. Take additional safety and health measures, or cause such measures to be taken as reasonably necessary. Maintain guards on machinery, equipment and other hazards as set forth in the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable laws.
9. Protect and preserve in operating conditions all utilities traversing the work area. Repair all damages to any utility due to work performed under this Contract, the satisfaction of the Architect and Owner at no additional cost to the Owner.

M. 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 10 and 241.

1. Prohibit smoking on-site and in construction areas. Comply with additional prohibitions on controlled substances specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide fire extinguishers and locate where convenient and effective for their intended purpose, but not less than one on each floor at or near each usable stairwell or exit.
5. 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.
6. Store combustible materials, inflammable materials, and volatile liquids in containers in fire-safe containers and locations under the Contractors control and supervision.
7. Do not permit accumulation of flammable rubbish to remain in the building overnight.
8. No gasoline may be stored in or close to the building at any time.
9. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires.
10. Observe strict safety precautions and provide supervision of welding operations, burning with a torch, combustion-type temporary heating units, and similar sources of fire ignition.

3.6 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan. Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials, including packaging boxes and/or materials, from coming into prolonged contact with concrete and masonry.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.
 - 4. Discard or replace water-damaged material.
 - 5. Do not install material that is wet.
 - 6. Discard and replace stored or installed material that begins to grow mold.
 - 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, which become wet during the course of construction and remain wet for forty-eight (48) hours are considered defective and require replacing.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for forty-eight (48) hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within forty-eight (48) hours.

3.7 SITE CLEANING AND MAINTENANCE

- A. Perform an inspection of the site, including areas outside of the Site boundaries, with the Owner, prior to the start of any Work, to determine the existing conditions.
- B. The General Contractor shall take all necessary precautions to prevent the spreading of dirt and dust. During demolition and all other work, take to contain dust and other debris from the Work within the limits of the site under the Contractor's control. Promptly clean up all dirt, dust and debris escaping from the work areas or dropped from vehicles traveling to and from the Work.
 - 1. Equip all vehicles used for transportation to, and removal of material from the site with

- covers, adequate to contain dust and debris within lawful acceptable limits.
 - 2. Provide facilities for preventing the spread of objectionable matter outside the site areas through washing of vehicles and vehicle wheels; decontamination of vehicles transporting hazardous waste containing materials such as asbestos, lead or other matter; and by all other means necessary.
 - 3. Provide a tire cleaning surface at each construction entrance. Provide adequate drainage and maintain surface for the duration of construction.
 - 4. Provide wetting of materials, soils and surfaces daily as required to eliminate dust.
- C. Prior to Substantial Completion, remove all spots, stains, dirt, and dust from all surfaces, including areas within other buildings and any portion of property of others, which were the result of the work of this project, to the satisfaction of the Architect.
- 1. Refer to Division 01 Section, "Closeout Procedures." For final cleaning requirements.
- D. Repair any damage to the building, site, the property of others or the Owner's equipment caused by the General Contractor, or its Subcontractors, at no additional cost to the Owner.
- 1. Re-grade and re-seed all lawn areas disturbed by construction activities. Coordinate with the Owner and provide water for a minimum of twenty-one (21) calendar days or until the lawn is well established and accepted by the Owner and Architect.

3.8 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. Prevent water filled piping from freezing. Maintain markers for underground lines and protect from damage during excavation.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
- 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures." Also provide the following:

- a. Replace all air filters and clean inside of ductwork and housings. Air filters that have been provided by HVAC Contractor shall be replaced by the same Sub- Contractor. Ductwork that has been provided by HVAC Sub-Contractor shall be cleaned by the same Sub-Contractor.
 - b. Replace significantly worn parts and any subject to unusual operating conditions. Worn parts in need of replacement that have been provided by Sub-Contractor shall be replaced by same Sub-Contractor.
- E. As a condition of the Architects Certification of Substantial Completion, restore site areas damaged by Work performed under this Contract to the condition existing at the start of the Work, unless otherwise directed by the Architect or Owner.

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. 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; and comparable products.
- B. Related Requirements:
 - 1. Division 01 Section "Summary" for Contractor requirements related to Owner-furnished products.
 - 2. Division 01 Section "Alternates" for products selected under an alternate.
 - 3. Division 01 Section "References" for applicable industry standards for products specified.
 - 4. Division 01 Section "Closeout Procedures" for submitting warranties.
 - 5. Divisions 02 through 50 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products unless otherwise indicated.
 - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in "Comparable Products" Article, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
 - 4. Unspecified Products: If an indicated product or item is not specified, the Contractor shall provide the quantity indicated in the Contract Documents. The product or item must be new, of average quality, and fit for the use for which it is intended. This does not apply to unspecified products or items that must be provided in accordance with the manufacturer's recommendation for a complete installation of a specified product or item. Such products or items shall be provided in accordance with the manufacturer's recommendation.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product

is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

1. Evaluating Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title, and Drawing numbers and titles.
 2. Data indicating compliance with the requirements specified in "Comparable Products" Article.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Division 01 Section "Submittal Procedures."
- F. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

- A. Product List: Electronically 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 Submittal 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. Projected delivery date or time span of delivery period.
 - h. Identification of items that require early submittal approval for scheduled delivery.
 3. Initial Submittal: Within thirty (30) calendar days after date of commencement of the Work, submit three (3) copies of 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 early in Contract period.
 4. Completed List: Within sixty (60) calendar days after date of commencement of the Work, submit three (3) copies of 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) calendar 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. Substitution Requests: Electronically submit each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 1. Substitution Request Form: Use form provided at the end of this section.
 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication, or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in

- the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
- m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) working days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within fifteen (15) calendar days of receipt of request, or seven (7) working days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.
- C. Comparable Product Requests: Electronically submit each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) working days of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within fifteen (15) calendar days of receipt of request, or seven (7) working days of receipt of additional information or documentation, whichever is later.
- a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
 - b. Use product specified if Architect cannot render a decision on use of a comparable product request within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
- 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products will be used.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
- 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is inconspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.

3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

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

1.6 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than thirty (30) calendar 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 meets or exceeds sustainability thresholds and/or requirements published in the Project Specifications where applicable.
 - 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 sixty (60) calendar 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 meets or exceeds sustainability thresholds and/or requirements published in the Project Specifications where applicable.
 - 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.

1.7 COORDINATION

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

1.8 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

1.9 PRODUCT WARRANTIES

- A. Warranties specified in other Sections are to be in addition to, and run concurrent with, other

warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of Owner or endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of Owner or endorsed by manufacturer to Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included in the Project Manual, prepare a written document, using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered when meeting the terms and conditions of Paragraph 1.7 of this section.
 4. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered when meeting the terms and conditions of Paragraph 1.7 of this section.
 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches and is acceptable.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements of Paragraph 1.7 of this section for a substitution.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, and textures" or a similar phrase, select a product that complies with other specified requirements.
1. 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.
 2. 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.
- E. Sustainable Product Selection: Where Specifications require product to meet sustainable product characteristics, select products complying with indicated requirements. Comply with requirements in Division 01 sustainability requirements Section and individual Specification Sections.
1. Select products for which sustainable design documentation submittals are available from manufacturer.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with the following requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects, with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Division 01 Section "Submittal Procedures."
1. Form of Approval of Submittal: As specified in Division 01 Section "Submittal Procedures."
 2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for comparable products. Approval by the Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

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SECTION 016000 - SUBSTITUTION REQUEST FORM

No substitutions will be considered without this completed substitution request form and supporting documentation. Substitutions made without completion of this form will be considered defective work.

Date: _____

Number: _____

Project: _____

To: DBVW Architects, Inc.

Re: Request for Substitution

The Contractor proposes the following substitution in accordance with the requirements of the Contract Documents.

Scope of Substitution: _____

Specification Reference: _____

Drawing Reference: _____

Reason for Proposed Substitution: _____

Impact on Project Cost: _____

Impact on Project Schedule: _____

Impact on Guarantees & Warranties: _____

Coordination Required with Adjacent Materials & Systems: _____

List Deviations From Specified Requirements: _____

Attachments: Attach Supporting documentation sufficient for Architect to evaluate substitution.

Substitution Request Forms submitted without adequate documentation will be returned without review.

Attachments: _____

Response Date: List date by which response by Architect is requested to maintain project schedule and allow sufficient time for inclusion of proposed substitution.

Response Date: _____

Submitted By: _____

Firm & Address: _____

Signature below signifies acceptance of responsibility for accuracy and completeness of information included in this Substitution Request Form.

Authorized Signature: _____

ARCHITECT'S RESPONSE

Notations listed below shall have same meaning as on Architect's approval stamp. Clarifications to or changes in project schedule or time shall be processed using standard project forms.

Architect's Response:	_____	Approved
	_____	Approved as Noted
	_____	Revise and Resubmit
	_____	Rejected
	_____	Returned without

Review

Remarks: _____

Date: _____

Signed: _____

END OF SUBSTITUTION REQUEST FORM

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation.
 - 4. Cutting and patching.
 - 5. Coordination of Owner's portion of the Work.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.
- B. Related Requirements:
 - 1. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 01 Section "Summary" for limits on use of Project site.
 - 3. Division 01 Section "Submittal Procedures" for submitting surveys.
 - 4. Division 01 Section "Selective Demolition" for demolition and removal of selected portions of the building and site.
 - 5. Division 01 Section "Indoor Air Quality Management Plan" for monitoring and maintaining indoor air quality during and after construction.
 - 6. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
 - 7. Division 07 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.
 - 8. Divisions 02 through 50 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Coring: Penetration of in-place construction with a drill that is designed to make the penetration in a manner such that the core can be removed to facilitate the installation or performance of other Work; including removal of the debris.
- C. Patching: Fitting and repair work required to restore construction to original conditions after

installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.
 - 1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Inform Architect and OPM of scheduled meeting. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, plumbing, fire protection, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.
 - 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- B. Layout Conference: Conduct conference at Project site.
 - 1. Prior to establishing layout of new and existing perimeter and structural column grid(s), review building location requirements. Review benchmark, control point, and layout and dimension requirements. Inform Architect and OPM of scheduled meeting. Require representatives of each entity directly concerned with Project layout to attend, including the following:
 - a. Contractor's superintendent.
 - b. Professional surveyor responsible for performing Project surveying and layout.
 - c. Professional surveyor responsible for performing site survey serving as basis for Project design.
 - 2. Review meanings and intent of dimensions, notes, terms, graphic symbols, and other layout information indicated on the Drawings.
 - 3. Review requirements for including layouts on Shop Drawings and other submittals.
 - 4. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor.
- B. Certified Property Surveys: Submit electronic PDF, showing the Work performed.
- C. Certificates: Submit certificate signed by land surveyor, certifying that location and elevation of improvements comply with requirements.
- D. Cutting and Patching Plan: Submit plan describing procedures at least ten (10) working days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 3. Products: List products to be used for patching and firms or entities that will perform

- patching work.
- 4. Dates: Indicate when cutting and patching will be performed.
- 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- E. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.6 CLOSEOUT SUBMITTALS

- A. Certified Final Property Surveys: Submit electronic PDF and two (2) hardcopies signed by land surveyor, showing the Work performed and the record survey data.

1.7 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Professional Engineer Qualifications: Refer to Division 01 Section "Quality Requirements."
- C. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - a. Contractor shall engage a professional engineer to design shoring, bracing, and support of structural elements during cutting and patching when required by the Architect and/or Owner.
 - b. Structural elements include but are not necessarily limited to the following:
 - 1) Foundation construction, bearing and retaining walls.
 - 2) Structural concrete.
 - 3) Lintels.
 - 4) Structural decking.
 - 5) Miscellaneous structural metals.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Plumbing piping systems.

- f. Mechanical systems piping and ducts.
 - g. Control systems.
 - h. Communication systems.
 - i. Fire-detection and -alarm systems.
 - j. Conveying systems.
 - k. Electrical wiring systems.
 - l. Operating systems of special construction.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. **Other construction elements include but are not limited to the following:**
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior aluminum storefront and curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
 - h. Roofing Systems.
 - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.
- E. Existing Warranties: Where applicable, remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
 - 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water-service piping; and underground electrical and communication/telephone services. Locate above ground services.
 2. The Contractor shall identify and resolve any conflicts with overhead utility lines, service poles, underground duct banks, or underground vaults with the OPM, Owner and/or proper utility company(s). The Contractor shall be responsible for all costs related to temporary relocation of utility services in order to perform the Work.
- C. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Examine roughing-in for mechanical, plumbing, fire protection, and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- D. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- E. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

- F. The Contractor shall not be entitled to make claim for any damages and/or costs due to the Contractor's failure to properly examine the existing conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility, OPM, and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
 - 1. The Contractor shall coordinate with the local utility, OPM, and Owner to remove or relocate any existing or abandoned utility lines that may be in conflict with construction activities. The cost of this work must be included in the Base Bid.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Division 01 Section "Project Management and Coordination."
 - 1. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect and OPM promptly.
- B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect and OPM when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and OPM.

3.4 FIELD ENGINEERING

- A. Identification: Contractor 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 and OPM. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and OPM before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base 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 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. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor to 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, streets, site improvements and utilities, existing improvements, and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 - 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation,

as indicated.

1. Make vertical work plumb, and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 4. Maintain minimum headroom clearances as follows, unless otherwise indicated on Drawings:
 - a. 86-inches to underside of bottom most projection and/or hanger associated with utilities and equipment in unoccupied spaces
 - b. 108-inches in occupied spaces without finished ceiling.
 - c. Fully concealed above finished ceilings in spaces with suspended ceiling systems.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties' involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
 4. All anchors and fasteners used on the exterior of the building and where dampness and corrosion shall be hot-dipped galvanized steel, unless stainless steel is indicated.
- I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.
- J. Materials: Use products, cleaners, and installation materials that are not considered hazardous.

1. All paint used on products to comply with federal regulations controlling the use of volatile organic components. (VOCs).

K. Repair or remove and replace damaged, defective, or nonconforming Work.

1. Comply with Division 01 Section "Closeout Procedures" for repairing or removing and replacing defective Work.

3.6 CUTTING AND PATCHING

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

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

C. Temporary Support: Provide temporary support of Work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Division 01 Section "Summary."

F. Existing Utility Services and Mechanical/Electrical/Plumbing/Fire Protection Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut and core in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering, and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Fire Protection, Plumbing, Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as

practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.

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

3.7 COORDINATION OF OWNER'S PORTION OF THE WORK

- A. Site Access: Provide access to Project site for Owner's construction personnel, vendors, or Owner's separate contractors.
1. Refer to Division 01 Section "Summary."
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel, vendors, or Owner's separate contractors.
1. Construction Schedule: Inform Owner and OPM of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner and OPM if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include OPM and Owner's construction personnel vendors and Owner's separate contractors at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and

- debris.
 - 2. Do not hold waste materials more than seven (7) calendar days during normal weather or three (3) calendar 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, in accordance with regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.
- 1. Remove liquid spills promptly.
 - 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 in accordance with written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris and carefully vacuum concealed spaces, including stud tracks, before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Sections "Temporary Facilities and Controls" and "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- 3.9 STARTING AND ADJUSTING
- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Sections and each respective Trade specification.
- B. Start equipment and operating components to confirm proper operation. Remove

malfunctioning units, replace with new units, and retest.

- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.10 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. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

- A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Restore permanent facilities used during construction to their specified condition.
- D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for salvaging, recycling, and disposing of non-hazardous demolition and construction waste.
 - 1. The General Contractor shall be responsible for providing all dumpsters required.
 - 2. All media and waste from blast cleaning operations shall be captured and fully contained from the surface of the work to the point of removal from the site; prevent contact with building surfaces, public circulation, and existing drainage systems.
 - a. Disposal shall be in accordance with regulations enacted by appropriate governmental agencies and Authorities Having Jurisdiction.
- B. Related Requirements:
 - 1. Division 01 Section "Summary" for coordination of responsibilities for waste management.
 - 2. Division 01 Section "Selective Demolition" for disposition of waste resulting from demolition of structures and site improvements.
 - 3. Division 04 Section "Historic Masonry Repair" for disposal requirements for masonry waste.

1.3 DEFINITIONS

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

1.4 MATERIALS OWNERSHIP

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

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit within seven (7) calendar days of date established for commencement of the Work.

1.6 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Final Waste Management Tabulation: Submit documentation, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for this Project have been met.
- H. Qualification Data: For waste management coordinator and refrigerant recovery technician.
- I. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for

recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1. Refer to Division 02 Section "Selective Demolition" for additional requirements and submittals.

1.7 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent may not serve as Waste Management Coordinator.
- B. Refrigerant Recovery Technician Qualifications: Universal certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.
- D. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
 2. Review requirements for documenting quantities of each type of waste and its disposition.
 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 5. Review waste management requirements for each trade.

1.8 PERFORMANCE REQUIREMENTS

- A. Separate, salvage, recycle and dispose of materials in accordance with State laws and regulations in which the Project is located.
 1. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. End-of-Project Rates for Salvage/Recycling: Achieve a minimum of fifty percent (50%) by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials during course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including but not limited to the following:
 1. Demolition Waste:
 - a. Asphalt paving, concrete, reinforcing steel, brick, and concrete masonry units.
 - b. Wood studs, joists, rafters, plywood, OSB, paneling and trim.
 - c. Structural and miscellaneous steel.
 - d. Metal studs, gypsum board, acoustical tile, and panels; carpet and pad.
 - e. Roofing and insulation.
 - f. Doors, frames, hardware; windows and glazing.

- g. Equipment.
 - h. Cabinets and/or casework.
 - i. Plumbing fixtures, piping, supports, hangers, and valves.
 - j. Mechanical equipment and refrigerants.
 - k. Electrical conduit, wiring, lighting fixtures, lamps, ballasts, electrical devices, switchgear, panelboards, and transformers.
2. Construction Waste:
- a. Masonry and CMU; lumber, wood, wood sheet materials and trim.
 - b. Metals; roofing, insulation, carpet, and pad; gypsum board.
 - c. Piping, electrical conduit.
 - d. Packaging: Regardless of salvage/recycle goal indicated in Paragraph 1.4.B above, salvage or recycle one hundred percent (100%) of uncontaminated packaging materials. (i.e., paper, cardboard, boxes, plastic sheet/film, polystyrene packaging, wood crates and plastic buckets and/or pails.)

1.9 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work. Refer to Division 02 Section "Selective Demolition."
 - 2. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 3. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 4. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
- D. Containment of Blast Cleaning Waste: Indicate how waste from blast cleaning operations will be contained and disposed of. Include details and materials of containment screens.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with operation, termination, and removal requirements in Division 01 Section "Temporary Facilities and Controls."
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to everyone concerned within three (3) calendar days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 - 2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.
- E. Waste Management in Existing Construction, and Historic Zones or Areas: Transportation equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12-inches or more.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Sale and Donation: Not permitted.
- B. Comply with requirements in Division 02 Section "Selective Demolition" and Section "Historic Removal and Dismantling" for salvaging demolition waste.
- C. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to

make items functional for use indicated.

- D. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area.
 - 5. Protect items from damage during transport and storage.
- E. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- F. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- G. Plumbing Fixtures: Separate by type and size.
- H. Lighting Fixtures: Separate lamps by type and protect from breakage.
- I. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

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

3.4 RECYCLING DEMOLITION WASTE

- A. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - 1. Pulverize concrete to maximum 1-1/2-inch size.
- B. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 - 1. Pulverize masonry to maximum 1-1/2-inch size.
 - 2. Clean and stack undamaged, whole masonry units on wood pallets.
- C. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- D. Metals: Separate metals by type.
 - 1. Structural Steel: Stack members according to size, type of member, and length.
 - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- E. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- F. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.
- G. Conduit: Reduce conduit to straight lengths and store by material and size.
- H. Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.

3.5 RECYCLING CONSTRUCTION WASTE

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

3.6 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction. Burning on-site is not permitted.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Provide adequate covering on all trucks and containers carrying debris and materials.
 - 4. Scope must include transport off-site.
- B. Disposal: Remove waste materials from Owner's property and legally dispose of them.
- C. Provide adequate covering on all trucks and containers carrying debris and materials.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final Completion procedures.
 - 3. List of incomplete items.
 - 4. Submittal of Project warranties.
 - 5. Final cleaning.
- B. Related Requirements:
 - 1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
 - 2. Division 01 Section "Execution" for progress cleaning of Project site.
 - 3. Division 01 Section "Photographic Documentation" for submitting Final Completion construction photographic documentation.
 - 4. Division 01 Section "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 5. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 6. Divisions 02 through 50 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items:
 - 1. Initial submittal at Substantial Completion.
 - 2. Certified list of incomplete items at Final Completion.
- C. Certificates of Release: From authorities having jurisdiction.
- D. Certificate of Insurance: For continuing coverage.

- E. Field Report: For pest-control inspection.
- F. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of fourteen (14) calendar days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect or Owner's Project Manager. Label with manufacturer's name and model number.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
 - 5. Submit testing, adjusting, and balancing records.
 - 6. Submit sustainable design submittals not previously submitted.
 - 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of fourteen (14) calendar days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the reasons why the Work is incomplete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Make final changeover of permanent locks and deliver keys to Owner.
 - 4. Advise Owner's personnel of changeover in security provisions.
 - 5. Complete startup and testing of systems and equipment.
 - 6. Submit test/adjust/balance records.
 - 7. Submit list of subcontractors, service providers, and principal vendors; including contact information where they can be reached for emergency service.
 - 8. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 - 9. Perform preventive maintenance on equipment used prior to Substantial Completion.
 - 10. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

11. Advise Owner of changeover in utility services.
12. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
13. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and releases.
14. Obtain and submit state signoffs and certificates for building equipment and systems. (i.e., boilers, elevators, etc.)
15. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
16. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
17. Complete final cleaning requirements.
18. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

- D. Inspection: Submit a written request for inspection to Architect and Owner to determine Substantial Completion a minimum of fourteen (14) calendar days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.6 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Submit a final Application for Payment in accordance with Division 01 Section "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list will state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
 5. Submit Final Completion photographic documentation.
 6. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, and similar final record information.
 7. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
- B. Inspection: Submit a written request for final inspection to determine acceptance to Architect and Owner a minimum of fourteen (14) calendar days prior to date the Work will be completed and ready for final inspection and tests. Upon receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

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

1.7 LIST OF INCOMPLETE ITEMS

- A. Organization of List: Submit General Contractor's list to Architect, OPM, and Owner. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use a form acceptable to the Architect and Owner.
 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor, listed by room or space number.
 2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect, OPM, and Owner.
 - d. Name of Contractor.
 - e. Page number.
 4. Submit list of incomplete items in the following format:
 - a. MS Excel Electronic File: Architect will return annotated file.
 - b. PDF Electronic File: Architect will return annotated file.

1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect and Owner for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within fourteen (14) calendar days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 1. Submit on digital media acceptable to Architect (USB flash drives)
 2. Upload to web-based project software site when provided.
- E. Warranties in Paper Form:
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or

- installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 4. Copies: Submit two (2) sets of hardcopy binders directly to Owner after approval of electronic submission by Architect and Engineers.

- F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, 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 not planted, mulched, or paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Clean flooring, removing debris, dirt, and staining; clean in accordance with manufacturer's instructions.
 - i. Clean all floor drains and cleanout covers in their entirety.
 - j. Vacuum and mop concrete.
 - k. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean in accordance with manufacturer's instructions if visible soil or stains remain.
 - l. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - m. Remove labels that are not permanent.
 - n. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and

similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

- o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure. Clean strainers.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils, if units were operated during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
 - r. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
 - s. Clean strainers.
 - t. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Division 01 Section "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste-disposal requirements in Division 01 Section "Construction Waste Management and Disposal."

3.2 CORRECTION OF THE WORK

- A. Complete repair and restoration operations required by "Correction of the Work" Article in Division 01 Section "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Division 01 Section "Execution" for final property survey.
 - 2. Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 3. Divisions 02 through 50 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings and Specifications: Include all addenda, contract modifications, field modifications, clarifications, and changes. Comply with the following:
 - 1. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and specifications.
 - 2) Submit Record Digital Data Files.
 - 3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit three (3) paper-copy set(s) of marked-up record prints.
 - 2) Submit PDF electronic files of scanned Record Prints and three (3) sets of file prints. Provide on USB flash drives.
 - 3) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Product Data: Submit annotated PDF electronic files and directories and one (1) paper copy of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- C. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit

annotated PDF electronic files and directories and one (1) paper copy of each submittal.

- D. Reports: Submit written report indicating items incorporated into Project Record Documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.2 RECORD DRAWINGS

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

- Delete, redraw, and add details and notations where applicable.
- 4. Refer instances of uncertainty to Architect for resolution.
- 5. Architect will furnish Contractor with one set of digital data files of the Bid/Construction Contract Drawings for use in recording information. (Architect will not provide updated electronic files at the end of construction for this use.)
 - a. See Division 01 Section "Project Management and Coordination" for requirements related to use of Architect's digital data files.
 - b. Record markups in separate layers.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 - 1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - 2. Format: Annotated PDF electronic file with comment function enabled.
 - 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 - 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect and Owner's Project Manager.
 - e. Name of Contractor.

1.3 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation, where installation varies from that indicated in Specifications, addenda, and Contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 - 5. Note related Change Orders, Product Data, and Record Drawings where applicable.
- B. Format: Submit record specifications as annotated PDF electronic file.
 - 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.4 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.
 - 1. In addition to documents being checked each month, submit electronically as built/record drawings at 25%, 50% and 75% stages of completion of construction for Architect, OPM, and Engineer(s) review. These will be reviewed as progress to ensure compliance with

documentation requirements. Payment of monthly General Conditions may be withheld for non-compliance with this requirement.

- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.
- C. Format: Submit Record Product Data as annotated PDF electronic file.
 - 1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.5 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.
 - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.6 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's and Owner's Project Manager's reference during normal working hours.
- B. Submission Requirements: Submit electronic pdf files of updated record drawings monthly, concurrent with the pencil copy of the Application for Payment. Payment of monthly General Conditions may be withheld for non-compliance with this requirement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

SECTION 018115 - INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

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. Per the requirements specified in this Section, General Contractor shall prepare and submit an IAQ Management Plan. The IAQ Management Plan shall highlight the five requirements of the Sheet Metal and Air Conditioning National Design/Builders Association (SMACNA), IAQ Guidelines for Occupied Buildings Under Construction, Latest Edition, Chapter 3 and shall embody the principles and practices set forth hereinafter.
- B. General Contractor, subcontractors, sub-sub-contractors, and their employees shall be provided instruction and training in the IAQ Management Plan.

1.3 SOURCE CONTROL

- A. Protect against moisture exposure. Building materials shall be kept dry to avoid the introduction of moisture into the building interior.
- B. Avoid the use of moisture-damaged materials. Any porous materials that have been wetted shall be dried thoroughly before installation. Any porous materials that have been damaged, remained wet longer than 48 hours, or show signs of visible mold shall be discarded.
- C. Ensure that the construction process will not result in moisture intrusion. In the event of rain or groundwater gaining entry to the building interior during construction, notify the Owner.
- D. Avoid tracking pollutants into work areas. Once the framing and mechanical system installation starts, access to the building interior shall be controlled to minimize the tracking in of contaminants. Material deliveries and construction waste removal shall be routed via the most direct route to the building exterior of the building rather than through the space. Provide rough track-off grates or matting at the entryway to remove moisture and contaminants from workers shoes. Prevent the ingress of rodents and pests. No smoking inside the building.
- E. Use low-emitting products. No product substitution is allowed unless authorized and stamped by the General Contractor. All products used shall comply with volatile organic compound (VOC) requirements of the SCAQMD. All MSDS sheets shall be approved by the General Contractor and stamped before materials enter the building. (Paints, glues, caulking, etc.)
- F. Allow high-VOC materials to off-gas prior to installation. New plastic, fabric, laminates, or assembled materials that are packaged or rolled-up shall be opened up and ventilated in a dry, secure, and well-ventilated room at a temperature between 60- and 90-degrees F, for a minimum of four (4) calendar days outside of buildings. Subcontractors shall off-gas materials in their shop and supply a letter of certification to Contractor prior to its arrival on site. There is no covered space on site to off-gas.

1.4 HVAC PROTECTION

- A. Heat, dehumidify and ventilate building during course of Work as necessary to maintain environmental conditions suitable for drying and curing materials and for prevention of conditions suitable for mold and mildew growth. Ventilate building removing moisture, dust, fumes, and odors. Temper and dehumidify air as needed to remove excess moisture. Refer to Division 01 Section "Temporary Facilities and Controls" for temporary heating requirements.
 - 1. During installation of carpet, paints, furnishings, and other VOC-emitting products, the Contractor shall provide supplemental (spot) ventilation for at least 72 hours after work is completed. Use of supply air fans and ducts only; exhaust provided through windows. Use exhaust fans to pull exhaust air from deep interior locations.
- B. Use temporary filtration media. If the HVAC system is to be used while construction work is being done, temporary filtration media shall be installed on all intakes near area of work, as directed by Owner. Such filtration media shall have a minimum filtration efficiency (Minimum Efficiency Reporting Value-MERV per ASHRAE 52.2) of 8. For air intakes into parts of a building that are very sensitive to dust contamination, such as computer rooms, filtration media with a MERV rating of 13 or higher is required. New filtration with a MERV rating as specified shall be installed after construction.
- C. Inspect filters regularly. When the HVAC system is being used during construction and temporary filters are installed, filters shall be inspected weekly and replaced as needed.
- D. Avoid contaminated air entry into enclosed parts of the building. When outdoor construction activities generate dust, combustion emissions, or other contaminants, operable windows, and outside air supplies to enclosed portions of the building shall be closed.

1.5 HOUSEKEEPING

- A. Minimize accumulation of dust and other contaminants. Construction practices shall be used that minimize the production of dust and other contaminants from construction activities. Use integral dust-collection systems on drywall sanders, cut-off saws, and routers. Confine dust-generation activities to areas where clean-up can be carried out easily and contaminants will not be tracked to other areas. Prevent construction dust from entering Owner occupied areas. Erect temporary partitions in accordance with Division 01 Section "Temporary Facilities and Controls."
- B. Suppress Dirt. Wetting agents or sweeping compounds shall be used to keep dust from becoming airborne. Clean up dust. Wet clothes, damp mops, and vacuum cleaners with high-efficiency particulate (HEPA) filters shall be used to clean up dust generated by construction activities. Cleaning frequency shall be increased when dust accumulation is noted.
- C. Clean up spills promptly. All spills and excess applications of solvent-containing products should be cleaned up using approved methods as soon as practicable.
- D. Keep work area dry. The entire area shall be kept as dry as practicable by promptly repairing any leaks that allow rainwater entry and mopping up any water accumulation. Use dehumidification, if necessary, for prompt drying of wetted spaces. Unvented combustion, such as propane or diesel "salamander" space heaters, shall not be used.
- E. Seal containers containing volatile liquids. Containers of fuel, paints, finishes, and solvents shall be kept tightly sealed and preferably stored outside of the building when not in use.

DBVW Architects, Inc.
Project No. 2417
Issued for Bid

Providence City Hall Exterior Restoration, Phase I
Providence, Rhode Island
March 11, 2026

END OF SECTION 018115

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CONSTRUCTION IAQ MANAGEMENT PLAN AGREEMENT

The General Contractor and all subcontractors and sub-sub-contractors shall comply with the following rules and regulations. All entities, superintendents, and/or foreman will provide training to their employees to ensure procedures and requirements of the IAQ program are followed.

Pollution Source Control

1. *Protect against moisture exposure.* Building material shall be kept dry to avoid the introduction of moisture into the building interior.
2. *Avoid use of moisture-damaged materials.* Any porous materials that have been exposed to moisture should be dried before being installed. Any porous material that has remained wet longer than 48 hours, or shows sign of visible mold, shall be discarded, and replaced.
3. *Ensure that the construction process will not result in moisture intrusion.* If water enters the building, notify the superintendent and necessary parties immediately.
4. *Use low-emitting products.* No product substitution is allowed unless authorized and stamped by the General Contractor. All products used shall comply with volatile organic compound (VOC) requirements of the SCAQMD. **All MSDS sheets shall be approved by the General Contractor and stamped before materials enter the building.** (Paints, glues, caulking, etc.)
5. *Avoid tracking pollutants into work areas.* Once stud framing and drywall begin, as well as the installation of the mechanical equipment, access to the building interior shall be limited to reduce the likeliness of contaminants entering the building. Material deliveries and construction waste removal shall be routed via the most direct route to the exterior of the building, rather than through the space. Provide rough track-off grates or matting at the entryway to remove moisture and contaminants from workers' shoes. Prevent the ingress of rodents and pests. **NO SMOKING IN BUILDINGS. SMOKING IS ONLY ALLOWED AT THE DESIGNATED AREA. NO EATING OR DRINKING IN BUILDINGS OTHER THAN IN DESIGNATED BREAK AREAS.**
6. *Allow high-VOC materials to off-gas prior to installation.* New plastic, fabric, laminates, or assembled materials that are packaged or rolled-up shall be opened up and ventilated in a dry, secure, and well-ventilated room at a temperature between 60- and 90-degrees F, for a minimum of four (4) calendar days outside of buildings. Subcontractors shall off-gas materials in their shop and supply a letter of certification to (builder name) Construction prior to its arrival on site. There is no covered space on site to off gas.

HVAC Protection

1. *Use temporary filters.* Temporary filters shall be used while work is being done if air handling equipment is operated. All temporary filtration media shall comply with MERV 8 (for air intakes into parts of a building very sensitive to dust contamination, i.e., a computer room, a MERV rating of 13 may be required). During construction, filters shall be inspected weekly and replaced as needed. After construction is complete, a filter with a MERV value of 13 shall be installed.
2. *Avoid contaminated air entry.* When dust is produced from heavy outside work, outside air supplies shall be closed.

Everyday House Keeping

1. *Minimize dust.* All methods of minimizing dust shall be used. Confine dust generating activities within temporary plastic enclosures where possible. Provide fans to exhaust temporary enclosures to the exterior. Use dust collection systems on tools and empty them into receptacles located outside of the building.
2. *Minimize dirt.* Wetting and sweeping compounds shall be used to keep floors clean of dirt and to keep dust from becoming airborne. These compounds shall be low odor emitting products.

- INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN
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SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes demolition and removal of selected portions of the existing building and salvage of existing items to be reused or recycled.
 - 1. Work includes but is not necessarily limited to: Portions of existing roofing and sheet metal cladding, including associated flashings, substrate panels, underlayments, sealant, and other materials.
 - a. Including all existing slate shingle, single-ply membrane, and flat seam metal roofing in the scope of work area for Phase I.
 - b. If applicable, hazardous materials to be removed under a separate contract.
 - 2. Off-site processing of masonry materials.
 - 3. Disconnection and/or temporary relocation of utilities and existing equipment as required to complete the scope of work.
 - 4. Pollution control, including dust and noise control.
 - 5. Legal disposal and recycling of waste materials.
 - 6. Dismantle, salvage and reinstallation of items, as indicated on the Drawings.
- B. Related Requirements:
 - 1. Division 01 Section "Summary" for restrictions on use of premises, phasing, and Owner requirements.
 - 2. Division 01 Section "Execution" for cutting and patching procedures.
 - 3. Division 01 Section "Construction Waste Management" for disposal and recycling of demolished materials.
 - 4. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
 - 5. Division 01 Section "Construction Progress Documentation" for progress photographs.

1.3 DEFINITIONS

- A. Remove and/or Remove and Dispose: 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 and/or Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise

indicated to be removed, removed and salvaged, salvaged, or removed and reinstalled.

- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled. Perform operations without damage to the material itself, adjacent materials, or to substrate.

1.4 MATERIALS OWNERSHIP

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

1.5 PREINSTALLATION MEETINGS

- A. Pre-Demolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Include Owner, Owner's Project Manager and Architect. Review methods and procedures related to selective demolition including, but not limited to, the following:
 - 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 pre-demolition pest control survey and extermination measures to prevent displacement and/or relocation of pests as a result of demolition activities.
 - 6. Review areas where existing construction is to remain and requires protection.
 - 7. Review procedures for noise control and dust control.
 - 8. Review procedures for protection of existing construction to remain.
 - 9. Walk the site with the Owner and Architect to flag items for salvage.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.

3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

- E. Pre-Demolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Division 01 Section "Photographic Documentation." Submit before Work begins.
- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

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

1.8 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Historic Removal Specialist Qualifications: An experienced firm that has specialized in historic removal work similar in material and extent to that indicated for this Project.
- C. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- D. Pest Control Firm Qualifications: An experienced, pest exterminator licensed in the state in which the Project is located.
- E. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
 1. The building will be operational and open to the public during the course of construction. Coordinate with Owner's requirements for use of the building during construction. Work shall be carried out to ensure the least possible disruption to the interior, entrances, and surrounding sidewalks and streets.
 2. Means of egress shall be maintained in a safe and accessible condition at all times.
 3. All sidewalks shall be maintained in a safe and accessible condition at all times.
 4. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.

5. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings. Do not close or obstruct walkways, roads, driveways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
 - B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical. Owner assumes no responsibility for building and site to be selectively demolished.
 1. Before selective demolition, Owner will remove stored items, furniture, fixtures, and equipment not designated on the Drawings for removal by the Contractor.
 2. Contents not specifically indicated to remain, to be removed and re-used or salvaged, are deemed to be refuse and must be removed and disposed of as part of the selective demolition work and included in the Base Bid.
 - C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
 - D. Hazardous Materials:
 1. May be present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials will be provided by the Owner for review and use. Examine report to become aware of locations where hazardous materials are present.
 - a. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - E. Storage or sale of removed items or materials on-site is not permitted.
 - F. Salvaging: Materials indicated on the Drawings or designated in the field by the Owner, Owner's Project Manager or Architect to be salvaged shall be carefully removed, packaged, and relocated to Owner's storage area. Protect items from damage during transport.
 - G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 1. Maintain fire alarm and fire-protection system in service during selective demolition operations.
- 1.10 WARRANTY
- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor and Owner before proceeding.
 - B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.
- 1.11 COORDINATION
- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Examine construction to be removed or dismantled to determine best methods to safely and effectively perform removal and dismantling work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed or dismantled and location of utilities and services to remain that may be hidden by construction that is to be removed or dismantled.
- D. Engage a professional engineer to design any temporary shoring and perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations. Maintain the services of said engineer throughout the course of construction.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
 - 1. Inventory and record the condition of items to be removed and salvaged.
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
- G. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate, and measure the nature and extent of conflict. Promptly submit a written report to Architect and Owner.
- H. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 PREPARATION

- A. Pest Control: General Contractor shall engage an experienced, licensed exterminator to make an initial inspection of the existing buildings and site. Perform necessary actions to rid Project of rodents, insects, and other pests prior to demolition. A final inspection is also required; refer to Division 01 Section "Closeout Procedures."

- B. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.
- C. Existing Facilities: Protect existing construction indicated to remain; adjacent walkways, roadways, driveways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated services/systems with Owner and Utility Company.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Cutting and capping of existing sewer lines shall be executed so no soil/debris enters down-stream of cap; and must occur at or near property line. Coordinate with local Department of Public Works.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.
 - 5. Cut off pipe or conduit a minimum of 24-inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
 - 6. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.
 - 7. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
 - a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent

injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
5. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
6. Provide provisions to limit dust and dirt migration off-site.
7. Cover and protect furniture, furnishings, and equipment that have not been removed.
8. Do not attach temporary protection to historic surfaces except as indicated.
9. Protect existing site improvements, appurtenances, and landscaping to remain.
10. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."

B. Temporary Shoring: Engineer/design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 1 hour after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
9. Locate selective demolition equipment and remove debris and materials so as not to

- impose excessive loads on supporting walls, floors, or framing.
10. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Work in Historic Areas: Selective demolition may be performed only in areas of Project that are not designated as historic. In historic spaces, areas, and rooms, or on historic surfaces, the terms "demolish" or "remove" shall mean historic "removal" or "dismantling" as specified in Division 01 Section "Historic Removal and Dismantling."
- D. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area.
 5. Protect items from damage during transport and storage.
- E. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.
- G. Promptly repair damage to existing buildings or items caused by demolition operations.
- 3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS
- A. Below-Grade Construction: Demolish foundation walls and other below-grade construction. Remove completely below-grade construction, including basements, foundation walls and footings.
- B. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.
1. Piping: Disconnect piping at unions, flanges, valves, or fittings.
 2. Wiring Ducts: Disassemble into unit lengths, remove plug-in and disconnecting devices.
- C. Masonry: Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts. Remove masonry carefully and erect temporary bracing and supports as needed to prevent collapse of materials being removed.
- D. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Refer to Division 07 Section

"Re-Roofing Preparation" for additional demolition information. Refer to Division 07 Sections for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, and roof accessories.
2. Remove existing roofing system down to substrate.

3.7 SITE RESTORATION

- A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from demolition operations with satisfactory soil materials as per backfill requirements in Division 31 Section "Earthwork."
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. Except for items or materials indicated to remain or to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction. Refer to Division 01 Section "Construction Waste Management and Disposal."
 1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.

3.9 CLEANING

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

END OF SECTION 024119

SECTION 024296 - HISTORIC REMOVAL AND DISMANTLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Historic treatment procedures for removal and dismantling work for designated historic spaces, areas, and surfaces and the following specific work:
 - a. Removal and dismantling of indicated portions of building or structure and debris hauling.
 - b. Salvage of existing items to be reused, replicated, or recycled.
 - c. Retain examples of all decorative elements for turning over to owner. Do not dispose of any decorative elements prior to reviewing with the Architect and Owner.

- B. Related Requirements:

- 1. Division 01 Section "Historic Treatment Procedures" for general historic treatment

1.3 DEFINITIONS

- A. Dismantle: To disassemble or detach a historic item from a surface, or a non-historic item from a historic surface, using gentle methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- B. Existing to Remain: Existing items that are not to be removed or dismantled, except to the degree indicated for performing required Work.
- C. Remove: To take down or detach a non-historic item located within a historic space, area, or room, using methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- D. Retain: To keep an element or detail secure and intact.
- E. Salvage: To protect removed or dismantled items and deliver them to Owner.

1.4 PRECONSTRUCTION MEETINGS

- A. Preconstruction Conference(s): Conduct conference(s) at Project site.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to removal and dismantling procedures and protection of historic areas and surfaces.
 - 2. Review list of items indicated to be salvaged.
 - 3. Verify qualifications of personnel assigned to perform removal and dismantling.
 - 4. Inspect and discuss condition of each construction type to be removed or dismantled.

5. Review requirements of other work that depends on condition of substrates exposed by removal and dismantling work.
6. Review methods and procedures related to removal and dismantling work, including, but not limited to, the following:
 - a. Historic removal and dismantling specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.
 - c. Fire prevention.
 - d. Coordination with building occupants.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Statements: For historic removal and dismantling specialist.
- B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by Contractor's removal and dismantling operations.
- C. Removal and Dismantling Historic Treatment Program: Submit 30 calendar days before work begins.
- D. List of Items Indicated To Be Salvaged: Prepare a list of items indicated on Drawings to be salvaged for Owner's use or for reinstallation. Submit 14 calendar days before preconstruction conference.
- E. Inventory of Salvaged Items: After removal or dismantling Work is complete, submit a list of items that have been salvaged.
 1. Include item description, item condition, number of items if more than one of a type, and tag number. **Include photo of item in original location.**
 2. As work proceeds, include on the inventory items that were indicated to be salvaged and items of historic importance discovered during the work. Document reasons, if any, why an item indicated to be salvaged was not salvaged.

1.6 QUALITY ASSURANCE

- A. Historic Removal and Dismantling Specialist Qualifications: A qualified historic treatment specialist. General selective demolition experience is insufficient experience for historic removal and dismantling work.
- B. Removal and Dismantling Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of removal and dismantling work, including protection of surrounding and substrate materials and Project site.
 1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
 2. Debris Hauling: Include plans clearly marked to show debris-hauling routes, turning radii, and locations and details of temporary protective barriers.

1.7 MOCKUPS

- A. Prepare mockups of specific historic removal and dismantling procedures specified in this Section to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Typical Removal Work, Limited Mockups:
 - a. Remove an approximately 50 sq. ft area of typical slate roof assembly.
 - b. Remove an approximately 50 sq. ft area of typical low-slope membrane roof assembly.
 - c. Remove an approximately 50 sq. ft area of typical low-slope metal roof assembly.
 - d. Remove 10 linear ft of parapet cladding (inside and outside face of parapet).
 - e. Remove 10 linear ft of cladding at the base of the dome.
 - f. Remove 10 linear ft of cladding at dome ribs.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- B. Regulatory Requirements: Comply with notification regulations of authorities having jurisdiction before beginning removal and dismantling work. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.8 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purposes will be maintained by Owner as long as practicable.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.
- C. Hazardous Materials:
 - 1. Hazardous materials may be encountered in the Work. A report on the presence of hazardous materials will be provided by the Owner. Examine report to become aware of locations where hazardous materials are present
 - a. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.
 - 1) In the case of asbestos, stop work in the area of potential hazard, shut off fans and other air handlers ventilating the area, and rope off area until the questionable material is identified. Resume work in the area of concern after safe working conditions are verified.
 - b. Do not disturb hazardous materials or items suspected of containing hazardous materials, except under procedures specified in the Contract Documents.
- D. Storage or sale of removed or dismantled items on-site is not permitted unless otherwise indicated.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 HISTORIC REMOVAL AND DISMANTLING EQUIPMENT

- A. Removal Equipment: Use manual, handheld tools. Handheld power tools may be permitted on a case-by-case basis with approval by Architect.
- B. Dismantling Equipment: Use manual, handheld tools, except as follows or otherwise approved by Architect on a case-by-case basis:
 - 1. Handheld power tools are permitted only as submitted in the historic treatment program. They must be adjustable so as to penetrate or cut only the thickness of material being removed.
 - 2. Pry bars more than 18-inches long and hammers weighing more than 2 lbs. are not permitted for dismantling work.

3.2 EXAMINATION

- A. Preparation for Removal and Dismantling: Examine construction to be removed or dismantled to determine best methods to safely and effectively perform removal and dismantling work. Examine adjacent work to determine what protective measures are necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed or dismantled and location of utilities and services to remain that may be hidden by construction that is to be removed or dismantled.
 - 1. Verify that affected utilities are disconnected and capped.
 - 2. Inventory and record the condition of items to be removed and dismantled for reinstallation or salvage. Enter this information on the inventory of salvaged items.
 - 3. Before removal or dismantling of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
 - 4. Engineering Survey: Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures as a result of removal and dismantling Work.
- B. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
- C. Perform surveys as the Work progresses to detect hazards resulting from historic removal and dismantling procedures.

3.3 HISTORIC REMOVAL AND DISMANTLING

- A. General: Have removal and dismantling work performed by a qualified historic removal and dismantling specialist. Ensure that historic removal and dismantling specialist's field supervisors are present when removal and dismantling work begins and during its progress.

- B. Comply with requirements in Section 013591 "Historic Treatment Procedures" for identifying and storing historic items.
- C. Perform work according to the historic treatment program and approved mockup(s).
 - 1. Perform removal and dismantling to the limits indicated.
 - 2. Provide supports or reinforcement for existing construction that becomes temporarily weakened by removal and dismantling work, until the Project Work is completed unless otherwise indicated.
 - 3. Perform cutting by hand or with small power tools as permitted by Architect wherever possible. Cut holes and slots neatly to size required, with minimum disturbance of adjacent work.
 - 4. Do not operate air compressors inside building unless approved by Architect in each case.
 - 5. Do not drill or cut columns, beams, joints, girders, structural slabs, or other structural supporting elements, without having Contractor's professional engineer's written approval for each location before such work is begun.
 - 6. Dispose of removed and dismantled items off-site unless indicated to be salvaged or reinstalled.
- D. Water-Mist Sprinkling: Use water-mist sprinkling and other wet methods to control dust only with adequate, approved procedures and equipment according to the historic treatment program to ensure that such water does not create a hazard or adversely affect other building areas or materials.
- E. Unacceptable Equipment: Keep equipment that is not permitted for historic removal or dismantling work away from the vicinity where such work is being performed.
- F. Removing and Dismantling Items on or Near Historic Surfaces:
 - 1. Use only dismantling equipment and procedures within 12-inches of historic surface. Protect historic surface from contact with or damage by tools.
 - 2. Wherever possible, unfasten items in the opposite order from which they were installed.
 - 3. Support each item as it becomes loosened to prevent stress and damage to the historic surface.
 - 4. Dismantle anchorages.
- G. Steelwork:
 - 1. Expose structural steel for examination by Architect and Contractor's professional engineer before proceeding with removal or dismantling.
 - 2. If distress in structure is apparent during performance of the work, stop removal or dismantling and take immediate precautionary measures to ensure safety of the structure. Inform Architect and Contractor's professional engineer of the problem, steps taken, and proposed corrective actions.
 - 3. Brace and support structural steel being removed and remaining during removal and dismantling.
 - 4. Concrete-Encased Steel: Where steel is known to be encased by concrete that is being removed, saw cut with blades that can cut no deeper than the thickness of the concrete cover, with an adequate margin for error in the location of the steel. Isolate sections of concrete by saw cutting before beginning removal.
- H. Anchorages:
 - 1. Remove anchorages associated with removed items.
 - 2. Dismantle anchorages associated with dismantled items.

3. In non-historic surfaces, patch holes created by anchorage removal or dismantling according to the requirements for new work.
4. In historic surfaces, patch or repair holes created by anchorage removal or dismantling according to Section that is specific to the historic surface being patched.

END OF SECTION 024296

SECTION 035114 – CEMENTITIOUS ROOF DECK

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 cementitious roof deck panels to be used to replace damaged sections of the existing roof deck in the area of the Project.
 - 1. Contractor shall keep stock of replacement material available as required to avoid delay if existing roof deck is found to be damaged. Contractor to assume the quantity of damaged clay tile will be equal to 10% of the total quantity in the area of work.
- B. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for wood sheathing and blocking.
 - 2. Division 07 Sections "Slate Roofing," "PVC Roofing," and "Fluid-Applied Roofing" for membrane roof systems.

1.3 PREINSTALLATION MEETINGS

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

1.4 SUBMITTALS

- A. Product Data: For each product.
 - 1. Indicate component materials, construction, dimensions, and installation instructions.
- B. Shop Drawings:
 - 1. Show panel layout, and locations/spacing of existing structural supports.
 - 2. Include details and manufacturer's recommended products for panel attachment, terminations, and penetrations.
- C. Product Test Reports: For cementitious roof deck panels, indicating compliance with specified requirements, for tests performed by a qualified testing agency.
- D. Samples:
 - 1. 6-inch-square sample of roof deck, indicating exposed texture visible in completed work.
 - 2. Labeled set of required fasteners and accessories for a complete installation.

- E. Warranty: Sample of manufacturer's standard warranty.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Utilize an installer with documented experience on similar projects.
 - 2. Letter of certification from the deck manufacturer stating that the installer has appropriate experience and is certified to install the deck system.
- B. Regulatory Requirements and Approvals:
 - 1. International Code Council (ICC): ICC-ES Evaluation Report ESR-1112.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
 - 1. Provide labels indicating brand name, deck type, panel size, and panel thickness.
- B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
 - 1. Prevent soiling, physical damage or wetting.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Provide roof deck panels designed and tested according to the following:
 - 1. Underwriters Laboratories UL 580 (UL Class 90 Design): Design No. NM511.
 - 2. Fire-Resistance Rating: As tested according to ASTM E119 and E2768; testing by a qualified testing agency.
 - a. Identify panels with appropriate markings of applicable testing agency.

2.2 CEMENTITIOUS ROOF DECK

- A. Cementitious Wood Fiber Board Roof Deck Panels: Panels consisting of FSC Certified aspen wood fibers bonded with inorganic hydraulic cement, Class A.
 - 1. Basis of Design Product: "Tectum III Structural Acoustic Roof Deck Panel" by Armstrong World Industries, Inc.
 - a. Type: Manufacturer's standard tile configuration for grouted installation.
 - b. Panel Thickness and Dimensions: As required to match existing and meet spans between existing supports.
 - 1) Contractor must field verify actual conditions.

- c. Existing Supporting Structure: Steel structure with steel bulb tees.

2.3 ACCESSORIES

- A. Fasteners: Provide fasteners of size and type indicated that comply with manufacturer's written requirements for installation.
 - 1. Provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117.
 - 2. Provide in lengths and types as required and recommended in writing by the roof deck panel manufacturer to penetrate steel structural members a minimum of 1-1/2 inch.
 - 3. Provide steel washers or plates as recommended by the roof deck panel manufacturer.
- B. Adhesive: Provide manufacturer's recommended adhesive as required.
- C. Grout: Provide manufacturer's recommended gypsum cement grout, ready for mixing with potable water to fill gaps between the roof deck panels and steel structure.

PART 3 - EXECUTION

1.1 EXAMINATION

- A. Examine areas, and structural framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine roof deck panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Do not proceed with installation if precipitation or freezing temperatures are forecast during installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of areas and substrates.

1.2 INSTALLATION

- A. Comply with the roof deck manufacturer's written instructions and recommended installation procedures.
- B. Place panel on joists with square cut ends butt tightly together.
- C. Stagger end joints. Seal joints larger than 1/4-inch with adhesive and larger joints with foam strips or expanding foam.

- D. Support panels with bent plates (steel or other support material) at roof transitions. Including, but not limited to perimeter and panel direction change conditions.
- E. Panel ends must terminate over structural members or supports with a minimum of 1-inch bearing on structural members. Grout at bulb tee purlins.
- F. Cut panels neatly to abut to parapets and rising walls, and to fit around openings and penetrations. Use manufacturer's recommended saw and techniques for field cutting.
- G. Apply adhesive to support members and on top of plank tongue in accordance with manufacturer's recommendations.
- H. Use manufacturer's recommended slide hammer or other tools to assure a tight joint at panel-to-panel joints. Hold panels in position until screws are installed.
- I. Install screws at each structural support in conformance with the approved Shop Drawings and manufacturer's recommended spacing and quantity.

1.3 CLEANING:

- A. Clean exposed surfaces of panel installation.
- B. Remove visible adhesive from exposed surfaces.
- C. Remove and replace work that cannot be cleaned or repaired, or which exhibits structural damage.

1.4 PROTECTION:

- A. Protect installed work from damage due to weather related moisture.
- B. Protect installed work from damage due to subsequent construction activity.
 - 1. Provide temporary protection as necessary to protect installed material from exposure to excessive moisture prior to installation of roofing material.

END OF SECTION 035114

SECTION 040310 – HISTORIC MASONRY CLEANING

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 cleaning historic stone masonry surfaces, including:
 - 1. General cleaning of exterior masonry (as indicated on the Drawings).
 - 2. Heavy soiling cleaning at select areas of exterior masonry elevations (as indicated on the Drawings)
 - 3. Ferrous staining removal at select areas of exterior masonry elevations (as indicated on the Drawings).
- B. Related Requirements:
 - 1. Division 01 Section "Historic Treatment Procedures."
 - 2. Division 02 Section "Selective Demolition."
 - 3. Division 04 Section "Historic Masonry Repointing" for repairing of existing mortar joints.
 - 4. Division 04 Section "Historic Masonry Repair" for repairing existing masonry.
 - 5. Division 07 Section "Sheet Metal Fabrications and Flashing" for metal flashing installed in or on repaired stonework.

1.3 UNIT PRICES

- A. Work of this Section is affected by unit prices specified in Division 01 Section "Unit Prices."
 - 1. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

- A. Very Low-Pressure Spray: Under 100 psi.
- B. Low-Pressure Spray: 100 to 400 psi
- C. Medium-Pressure Spray: 400 to 800 psi
- D. Stone Terminology: ASTM C 119.

1.5 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to cleaning masonry including, but not limited to, the following:
 - a. Verify masonry cleaning equipment and facilities needed to make progress and avoid delays.
 - b. Materials, material application, and sequencing.
 - c. Cleaning program.
 - d. Coordination with building occupants.
 - e. Coordination with interior construction work.

1.6 SEQUENCING AND SCHEDULING

- A. Work Sequence: Perform masonry-cleaning work in the following sequence:
 - 1. Inspect for open mortar joints. Where repairs are required, delay further cleaning work until after repairs are completed, cured, and dried to prevent the intrusion of water and other cleaning materials into the wall.
 - 2. At exterior elevations, provide adequate protection at all adjacent window and door openings adjacent to the work that is both watertight and protects glazing from damage.
 - 3. Clean masonry surfaces.

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include material descriptions and application instructions.
 - 2. Include test data substantiating that products comply with requirements.

1.8 INFORMATIONAL SUBMITTALS

- A. Contractor Qualifications Data: Submit documentation of the qualifications of the Contractor and any Sub-Contractor(s) to the Contractor, as specified in the Article, "Quality Assurance."
 - 1. Qualifications Data shall be prepared by the Contractor or Sub-Contractor proposing to perform the specified Work.
 - 2. Qualification Data for persons who will be completing the Work to demonstrate their capabilities and experience. Include a list of completed projects with names of persons involved.
- B. Qualification Data: For chemical-cleaner manufacturer.
- C. Preconstruction Test Reports: For cleaning materials and methods.
- D. Protection Plan.
- E. Cleaning program.

1.9 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: Engage an experienced stone restoration and cleaning firm with a minimum of five (5) years of experience to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.
1. Field Supervision: Maintain experienced full-time supervisors on Project site during times that stone restoration and cleaning work is in progress. Supervisors shall not be changed during Project except for causes beyond control of restoration specialist firm.
 2. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing.
 3. The company proposing to perform Work requiring qualifications as specified in this Section shall be considered as a firm part of the bid. Substitutions after the Award of Contract can only be made subject to the Owner's review and approval of new Qualifications Data by the proposed substitute company. Substitutions for key persons identified on the Qualifications Data will be subject to review and approval at the discretion of the Owner and Architect.
- B. Chemical-Cleaner Manufacturer Qualifications: A firm regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-trained representatives who are available for consultation and Project-site inspection and assistance at no additional cost.
- C. Cleaning Program: Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used; protection of surrounding materials; and control of runoff during operations. Include provisions for supervising worker performance and preventing damage.
1. If materials and methods other than those indicated are proposed for any phase of cleaning work, add a written description of such materials and methods, including evidence of successful use on comparable projects and demonstrations to show their effectiveness for this Project.
- D. Mockups: Prepare mockups of cleaning on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution.
1. Masonry Cleaning: The Contractor shall be required to complete cleaning samples for each cleaning method in any area as directed by the Architect and Owner.
 - a. Contractor shall assume a mockup shall be required for each cleaning method at each type of stone at each exterior building elevation.
 - b. The cleaning samples shall be a minimum of 4'-0" x 4'-0" and shall demonstrate the Contractor's understanding of the specified cleaning process and the aesthetic results of each test.
 - c. At each mockup, the Contractor shall provide at least two (2) samples varying in duration.
 - d. Coordinate General Cleaning mockup(s) with masonry repointing mockup(s). Refer to Division 04 Section "Historic Masonry Repointing."
 - e. The final duration of exterior cleaning shall be determined based on the results of the mockups. Contractor shall not proceed with cleaning of exterior masonry at a given elevation until Architect and Owner provide approval of applicable mockups.
 - f. Samples shall be redone as many times as necessary to the satisfaction of the Architect and Owner at no additional cost to the Owner.

2. Final mock-up locations to be coordinated in the field with Owner and Architect.
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. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry-cleaning work to be performed according to product manufacturers' written instructions and specified requirements.
- B. Clean masonry surfaces only when air temperature and masonry surface is 50 deg F and above and is predicted to remain so for at least seven (7) days after completion of cleaning.
- C. Take the necessary precautions to protect adjacent materials, buildings, spaces, and people in the area from masonry restoration and cleaning activities.
 1. Use vacuum systems to minimize dust where approved.
 2. Control dust at the building exterior and interior and at air intakes to the building's ventilation system.
 3. Seal all openings in the building envelope including windows and doors during dusty operations.
 4. When the HVAC systems allow, the building air pressure should be positive to keep dust from infiltrating through windows and doors.
 5. Protect existing leaded glass windows from chemical cleaners.
 6. Protect interior finishes from all cleaning products during cleaning operations.

1.11 COORDINATION

- A. Coordinate masonry cleaning with public circulation patterns at Project site. All exterior work is near public circulation patterns.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials to be used for cleaning, including cleaning compounds, detergents and solvents shall be in accordance with specifications. All materials with appropriate technical information shall be submitted to the Architect for final approval.
- B. All cleaning materials shall have been manufactured for the purpose for which they are proposed for use.
- C. Injurious acids of any ingredient that independently or in combination with other compounds, fluids, or solutions which will damage the masonry shall not be used. Methods or products causing etching or abrasion damage to the surface finish are prohibited.

1. Cleaning products containing hydrochloric (muriatic) or hydrofluoric acid shall not be used.
- D. All chemical materials and application methods shall be safe in use and shall not violate city, state, or federal environmental or safety regulations.
- E. Water: Clean, from city supply. Water shall be potable and free from injurious amounts of oil, soluble salts, alkali, acids, organic impurities, and other deleterious materials.
- F. Materials for use in removing dirt, stains, or other discolorations such as corrosion stains shall be commercially available and subject to environmental limitations.
- G. Precise composition and strength of the chemicals proposed by the Contractor shall remain subject to the Architect's approval.

2.2 CLEANING MATERIALS

- A. Intent: It is the intent that the cleaning program begins with the gentlest means possible to remove existing soiling and/or staining. Architect shall inspect results of gentlest cleaners and instruct as to whether working up to stronger cleaners is necessary.
- B. General:
 1. The cleaning methods discussed below are to be tested for appropriate use at each building material.
 2. Select products for special masonry cleaning areas, which include areas that target efflorescence, biological and ferrous staining that are manufactured by the following companies and have been developed to clean the specific type of stains described in this specification section. Approved manufacturers for chemical and detergent cleaning materials include but are not limited to:
 - a. Cathedral Stone Products, Inc., 7266 Park Circle Drive, Hanover MD 21076
 - b. ProSoCo, Inc., 3741 Greenway Circle, Lawrence, KS 66046.
 - c. Diedrich Chemicals - Restoration Technologies, Inc., 7373 South 6th Street, Oak Creek, WI.
 - d. Chemique, Inc., 315 N. Washington Avenue, Moorestown, NJ 08057.
 - e. K&E Chemical Co., Inc., 3960 East 93 Street, Cleveland, OH 44105.
 - f. Remmers BVBA, Bouwelven 19, B-2280 Grobbendonk, Belgium.
 - g. American Building Restoration Products, Inc., 9720 South 60th Street, Franklin, WI 53132.
 - h. Dumond Chemicals, Inc., 1475 Phoenixville Pike, Suite 18, West Chester, PA 19380.
 3. Approved manufacturers for the spraying equipment including the fine spray hollow cone nozzles include but are not limited to:
 - a. Fine spray, hollow cone nozzles: Spraying Systems Co., 200 West North Avenue, Glendale Heights, IL, 60187.
 - 1) Distributed by: Spraying Systems Northeast, 243 Daniel Webster Highway, Merrimack, NH, 03054.

4. Subject to compliance with all project requirements, comparable products and processes may be accepted by the Architect. If proposed equal is submitted, thorough testing shall be required at the Contractor's expense, to establish equivalent performance levels.
- C. Field-Mixed Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.
- D. Preformulated Detergent or General Chemical Cleaner: Manufacturer's standard formulation general cleaner, appropriate for the type of masonry surfaces to be cleaned.
 1. Prosoco: "2010 All Surface Cleaner".
 2. Prosoco: "Sure Klean 766 Limestone and Masonry Prewash and Afterwash".
 3. Prosoco: "Enviro Klean SafRestorer".
 4. Prosoco: "Enviro Klean Klean'N'Release".
 5. Sunshine Maker's, Inc.: "Simple Green".
 6. Or approved equal.
- E. Ferrous Staining: For surface stains, application of Ferrous Stain Remover according to manufacturer's instructions and as determined in field sample, each application followed by power wash delivered at maximum of 200 psi. A maximum of two (2) applications of ferrous stain remover will be considered at any one area on the building. After chemical cleaning has been completed, clean area of the building with general detergent and low-pressure water. Contractor shall take a PH test of the stone to insure that the surface has been neutralized. The Contractor shall repeat the cleaning with detergent until the PH testing of the stone is neutral. For areas indicated on drawings clean surfaces per manufacturer's instructions with one of, but not limited to, the following products:
 1. Prosoco: "Sure Klean Iron Stain Remover".
 2. Chemique: "Artisan Heavy Duty Rust Remover"
 3. Chemique: "Artisan Light Duty Rust Remover"
 4. Or approved equal.
- F. Heavy Soiling: For areas indicated on Drawings, clean surfaces per manufacturer's instructions with one of, but not limited to, the following products:
 1. Prosoco: "Light Duty Restoration Cleaner"
 2. Prosoco: "Sure Klean Restoration Cleaner"

2.3 ACCESSORY MATERIALS

- A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.
 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. "Rubber Mask" by ABR Products, Inc.
 - b. "Price Mask" by Price Research, Ltd.
 - c. "Sure Klean Strippable Masking" by ProSoCo.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, interior finishes, and other surfaces that could be harmed by such contact.
 - 1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of cleaning work.
 - 2. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless products being used will not damage adjacent surfaces. Use protective materials that are waterproof and UV resistant. Apply masking agents according to manufacturer's written instructions. Do not apply liquid strippable masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 - 3. Do not apply cleaning solutions during winds of enough force to spread them to unprotected surfaces.
 - 4. Neutralize alkaline and acid wastes before disposal.
 - 5. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
- B. Protection of Adjacent Building Surfaces: Comply with recommendations of manufacturers of masonry restoration and cleaning products for protecting building surfaces against damage from exposure to their products.
 - 1. Prevent chemical cleaning solutions from coming into contact with other surfaces which could be damaged by such contact. Protect surfaces that are not scheduled to be cleaned.
 - 2. Protect glass, metal grilles, windows, doors, unpainted metal trim, and polished stone from contact with chemical cleaners by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape. Apply masking agent to comply with manufacturer's recommendations. Do not apply liquid masking agent to painted or porous surfaces.
 - 3. Protect unpainted and painted metal railings from contact with chemical cleaners by covering them either with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. All building surfaces and open joints should be protected and prepared to prevent water intrusion into the building and the masonry wall assembly.
 - 5. Install plastic to seal off work area from adjacent areas.
 - 6. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
- C. Remove hardware adjacent to immediate work area and store during masonry cleaning. Reinstall when masonry cleaning is complete.
- D. All materials and application equipment shall be subject to measures to prevent environmental pollution and to maintain public safety while in use, in compliance with OSHA, and the referenced specifications.
- E. Disposal of Cleaning Materials:

1. It is the Contractor's sole responsibility to collect, package and dispose of materials used in the cleaning process. Dispose of particles and run-off from cleaning and restoration operations by legal means and in a manner which prevents undermining of pavement and foundations, damage to adjacent buildings fabric, and water penetration into the building interiors.
2. Neutralize alkaline and acid wastes before disposal
3. Immediately and safely dispose of airborne particulates that result from the cleaning process to prevent injury to the public.
4. Disposal of runoff shall comply with the requirements of the Owner and all local governmental and environmental agencies.
5. Contractor shall obtain prior written approval from the appropriate governmental agencies for use of and disposal of proposed cleaning materials. Contractor shall comply with governing law and requirements set by such agencies. Contractor shall provide information on the pH of chemical/rinse run-off for a determination by the Authority Having Jurisdiction whether run-off must be contained for off-site disposal. Testing to be verified by an Independent Testing Laboratory at the Contractor's expense.

3.2 MASONRY CLEANING METHODS

A. General:

1. Use very-low-pressure and low-pressure spray at all times.
 - a. Do not use pressure above 400 psi without prior approval by Architect.
2. Proceed with cleaning in an orderly manner; work from top to bottom of each vertical drop and from one end of each elevation to the other. Ensure that dirty residues and rinse water do not wash over dry, cleaned surfaces.
3. Use only those cleaning methods indicated for each masonry material and location.
4. Perform each cleaning method indicated in a manner which results in uniform coverage of all surfaces, including corners, moldings, interstices and which produces an even effect without streaking or damage to masonry surfaces.
5. Rinse off chemical residue and soil by working upwards from bottom to top of each treated area at each stage or setting.
 - a. Keep wall wet below area being cleaned to prevent streaking from runoff.
6. Contractor shall monitor any water misting/wash to ensure that no water is entering the building. If water is determined to be entering around windows, doors, flashing, etc. The Contractor shall shut-off the misting/wash systems, immediately clean-up the water, and determine the source of entry prior to re-starting-the cleaning process. The Contractor shall also be responsible for repairing any damage materials in kind at no cost to Owner.
7. The Contractor shall also maintain a water watch when the misting/wash is being completed to ensure that there are no leaks in any of the hoses and no water entering the building. The Contractor shall control the water run-off to direct the water away from building entrances. The Contractor shall also install lockable valves on each section of hose to prevent vandalism and either unsupervised or unauthorized use.

B. Water Application Methods:

1. Power Wash Applications: Spray-apply water to masonry surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume and equipment.

- a. Unless otherwise indicated, hold spray nozzle at a minimum of 6" from the surface of masonry and apply water from side-to-side in overlapping bands to produce uniform coverage and an even effect.
 - b. Equip units with pressure gauges.
 - c. For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees.
- C. Additional cleaning, processes, treatments, and methods for the different masonry types, if required, shall be determined in the field as required and coordinated with the Architect and Owner.
- D. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from 10 feet away by Architect.
 1. Perform additional general cleaning and stain removal, and spot cleaning of small areas that are noticeably different, so that cleaned surfaces blend smoothly into surrounding areas.
- E. Brushes:
 1. Do not use wire brushes, brushes that will damage masonry or mortar joints, or brushes that are not resistant to chemical cleaner being used.
 2. Use natural fiber brushes unless chemical cleaner requires nylon or plastic bristles.
- F. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.3 PRELIMINARY CLEANING

- A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from stone surfaces.
 1. Do not remove biological growth if doing so will damage masonry surface. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal.
 2. Remove loose soil or debris from open joints to whatever depth they occur.
 3. Do not remove biological growth if doing so will damage masonry surface.
- B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to planned cleaning methods. Extraneous substances include paint, caulking, asphalt, and tar.
- C. Efflorescence: Gently remove efflorescence by scrubbing with a stiff bristle brush. Refer to Paragraph 3.5,C for additional procedures.

3.4 SPECIAL CLEANING

- A. Detergent Cleaner Application: For field-mixed or preformulated detergent solution.
 1. Wet surface with water applied by low-pressure spray.

2. Scrub surface with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that surface remains wet.
 3. Rinse with water applied by low-pressure spray to remove detergent solution and soil
- B. Chemical Cleaner Application: Apply chemical cleaners to masonry surfaces according to chemical-cleaner manufacturer's written instructions.
1. Wet surface with water applied by low-pressure spray.
 2. Apply cleaner to surface by brush, working into joints and crevices. Apply quickly and do not brush out excessively, so area is uniformly covered with fresh cleaner and dwell time is consistent throughout area being cleaned.
 3. Allow cleaner to remain on surface for length of time recommended by manufacturer and established by mockup.
 4. Do not allow cleaner to dry on surface of masonry. Reapply as necessary to maintain wet surface with uniform coverage.
 5. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.
 6. Rinse off chemical residue and soil with water applied by low-pressure spray, working upward from bottom to top of each treated area.
 7. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.
 8. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.
 9. Repeat cleaning procedure, where needed to produce cleaning effect established by mockup. Do not repeat more than once.

3.5 GENERAL CLEANING

- A. The following cleaning processes apply to general cleaning of the exterior masonry and for the final procedure as part of all special cleaning.
- B. General Cleaning: After each special cleaning operation, clean surface of masonry as follows to ensure that all chemical cleaners have been removed from the surface. In addition, the Contractor shall complete a PH test on the surface of the masonry at areas where special cleaning has been completed to ensure that the surface has been returned to a PH neutral:
1. Pre-wet wall with very-low-pressure spray.
 2. Apply detergent cleaner with natural fiber bristle brush. Scrub to remove all surface discoloration and biological/animal growth.
 3. Rinse with low pressure to remove detergent.
 4. Repeat application as required to achieve a uniform appearance acceptable to the Architect.
- C. Efflorescence: After general cleaning has been performed on the masonry, the stains will be reviewed in the field by the Architect.
1. Efflorescence shall be gently removed using a stiff bristle brush.
 2. Remaining efflorescence shall be removed using a mild detergent and stiff bristle brush.
 3. Repeat general cleaning as defined in this paragraph.
 4. After surfaces dry out, some white efflorescence may be visible. If leaching occurs, Contractor shall repeat general cleaning to remove all efflorescence.

3.6 FINAL CLEANING

- A. Clean adjacent non-masonry surfaces of spillage and debris. Use detergent and soft brushes or cloths.
- B. Remove masking materials, leaving no residues that could trap dirt.

END OF SECTION 040310

SECTION 040323 – HISTORIC MASONRY REPOINTING

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 historic treatment work consisting of repointing brick and stone masonry as follows:
 - 1. Repointing exterior stone masonry joints.
- B. Related Requirements:
 - 1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.
 - 2. Section 040310 "Historic Masonry Cleaning" for cleaning of masonry.
 - 3. Section 040342 "Historic Masonry Repair" for repairing of existing masonry.
 - 4. Section 076200 "Sheet Metal Flashing and Trim" for metal flashing installed in or on repaired stonework.
 - 5. Section 079200 "Joint Sealants" for pointing masonry joints with sealant.

1.3 DEFINITIONS

- A. Low-Pressure Spray: 100 to 400 psi, 4 to 6 gpm
- B. Rift: The most pronounced direction of splitting or cleavage of a stone. Rift may be obscure in igneous rocks such as granite. Often it is obvious, as with bedding planes in many sedimentary stones.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference historic masonry repair and repointing at the Project site.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to masonry historic treatment and repointing.
 - 2. Review methods and procedures related to repointing historic masonry, including, but not limited to, the following:
 - a. Materials, material application, sequencing, tolerances, and required clearances.
 - b. Quality-control program.
 - c. Fire-protection plan.

- d. Masonry historic treatment program.
- e. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

- A. Order sand and portland cement for pointing mortar immediately after approval of mockups. Take delivery of and store at Project site a sufficient quantity to complete Project.
- B. Work Sequence: Perform masonry historic treatment work in the following sequence, which includes work specified in this and other Sections:
 - 1. Remove any existing plant growth.
 - 2. Inspect masonry for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
 - 3. General masonry cleaning.
 - 4. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
 - 5. Repair masonry, including replacing existing masonry with new masonry materials.
 - 6. Rake out mortar from joints to be repointed.
 - 7. Point mortar joints.
 - 8. After repairs and repointing have been completed and cured (allow for 28 day cure time prior to final cleaning), perform a final rinse of the building using low-pressure water to remove residue(s) from this work.
- C. As scaffolding is removed, patch anchor holes used to attach scaffolding.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include recommendations for product application and use. Include test data substantiating that products comply with requirements.
- B. Samples for Initial Selection: For the following:
 - 1. Colored Mortar: Submit sets of mortar that will be left exposed in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.
 - a. Have each set contain a close color range of at least six (6) Samples of different mixes of colored sands and cements that produce a mortar matching the existing, cleaned mortar when cured and dry.
 - b. Submit with precise measurements on ingredients, proportions, gradations, and sources of colored sands from which each Sample was made.
 - 2. Sealant materials.
 - 3. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.7 INFORMATIONAL SUBMITTALS

- A. Quality-control program.
- B. Masonry historic treatment program.

1.8 QUALITY ASSURANCE

- A. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising worker performance and preventing damage.
- B. Mockups: Prepare mockups of historic treatment on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Repointing: Rake out joints in each type of masonry required to be repointed. Up to three (3) mock-ups shall be required per masonry type and mortar color. Each mock-up shall be approximately 36 inches high by 36 inches wide for each type of repointing required, and repoint one (1) of the areas.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- 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 hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two (2) days.
- D. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repointing work to be performed according to product manufacturers' written instructions and specified requirements.
- B. Temperature Limits, General: Repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven (7) days after completion of the Work unless otherwise indicated.

- C. Cold-Weather Requirements: Comply with the following procedures for mortar-joint pointing unless otherwise indicated:
 - 1. When air temperature is below 40 deg F, heat mortar ingredients and existing masonry walls to produce temperatures between 40 and 120 deg F.
 - 2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for seven (7) days after pointing.
- D. Hot-Weather Requirements: Protect mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.
- E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.
- F. At all times, walls surrounding roof areas shall be adequately protected from droppings.

1.11 COORDINATION

- A. Coordinate masonry restoration with public circulation patterns at Project site. Some work is near public circulation patterns. Public circulation patterns cannot be closed off entirely, and in places can be only temporarily redirected around small areas of work. Plan and execute the Work accordingly.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain each type of material for repointing historic masonry (cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150/C 150, Type I both white and gray where required for color matching of exposed mortar.
 - 1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S by Minute Man or equal.
- C. Mortar Aggregate: ASTM C 144 unless otherwise indicated.
 - 1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.

2. Color: Provide natural sand or other sound stone of color necessary to produce required mortar color.
 3. Provide sand with rounded edges.
- D. Mortar Pigments: ASTM C 979/C 979M, compounded for use in mortar mixes, and having a record of satisfactory performance in masonry mortars.
1. Solomon Colors, Inc., Springfield, IL
 2. Davis Colors, Los Angeles, CA
- E. Water: Potable, free from injurious amounts of oil, soluble salts, alkali, acids, organic impurities, and other deleterious materials.

2.3 ACCESSORY MATERIALS

A. Sealant Materials:

1. Sealant manufacturer's standard elastomeric sealant(s) of base polymer and characteristics indicated below and according to applicable requirements in Section 079200 "Joint Sealants."
2. Colors: Provide colors of exposed sealants to match colors of mortar adjoining installed sealant unless otherwise indicated.
3. Ground-Mortar Aggregate ("Sand Finish"): Custom crushed and ground pointing mortar sand or existing mortar retrieved from joints. Grind to a particle size that matches the adjacent mortar aggregate and color. Remove all fines passing the 100 sieve.

B. Joint-Sealant Backing:

1. 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. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended in writing by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

C. Weep/Vent Products: Use the following unless otherwise indicated:

1. Wicking Material: Absorbent rope, made from cotton or UV-resistant synthetic fiber, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch exposure on exterior and 18 inches in cavity.
2. Round Plastic Weep Holes: Medium-density polyethylene, 1/4" or 3/8-inch OD by 4 inches long provided with wicking material and stainless steel insect screen.

D. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.

E. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.

2. Minimal possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could do the following:
 - a. Remove, alter, or harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in Contract.
 - b. Leave residue on surfaces.

2.4 MORTAR MIXES, GENERAL

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
 1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one (1) hour of final mixing; do not retemper or use partially hardened material.
- B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
 1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black, which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.
- C. Do not use admixtures in mortar unless otherwise indicated.
- D. Mixes: Mix mortar materials in the following proportions:
 1. Pointing Mortar by Type: ASTM C 270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime. Add mortar pigments to produce mortar colors required. Mortar shall be composed of 1 Part Portland Cement, 1 Part Hydrated Lime and 6 Parts sand mixed with potable water.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Prevent mortar from staining face of surrounding masonry and other surfaces.
 1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
 2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
 3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.

- B. Remove gutters and downspouts and associated hardware adjacent to immediate work area and store during masonry repointing work. Reinstall when repointing is complete.

- 1. Provide temporary rain drainage during work to direct water away from building.

3.2 MASONRY REPOINTING, GENERAL

- A. Appearance Standard: Repointed surfaces are to have a uniform appearance as viewed from 10 feet away by Architect.

3.3 REPOINTING MASONRY

- A. Rake out and repoint joints to the following extent:

- 1. All joints in areas indicated on Drawings or noted elsewhere in the Project Manual.
 - 2. Joints indicated as sealant-filled joints.
 - 3. Joints at locations of the following defects:
 - a. Holes and missing mortar.
 - b. Cracks that can be penetrated 1/4 inch or more by a knife blade 0.027 inch thick.
 - c. Cracks 1/8 inch or more in width and of any depth.
 - d. Hollow-sounding joints when tapped by metal object.
 - e. Eroded surfaces 1/4 inch or more deep.
 - f. Deterioration to point that mortar can be easily removed by hand, without tools.
 - g. Joints filled with substances other than mortar.

- B. Do not rake out and repoint joints where not required.

- C. Rake out joints as follows, according to procedures demonstrated in approved mockup:

- 1. Remove mortar from joints to depth of 2-1/2 times joint width, but not less than 1/2 inch or not less than that required to expose sound, unweathered mortar. Do not remove unsound mortar more than 2 inches deep; consult Architect for direction.
 - 2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
 - 3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
 - a. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar in bed joints and mortar in head joints by hand with chisel and resilient mallet. Strictly adhere to approved quality-control program. Take care not to cut the edges of existing masonry.

- D. Notify Architect of unforeseen detrimental conditions, including voids in mortar joints, cracks, loose masonry, rotted wood, rusted metal, and other deteriorated items.

- E. Pointing with Mortar:

- 1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.

2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
 3. After deep areas have been filled to same depth as remaining joints, point joints by placing mortar in lifts not greater than 3/8 inch. Fully compact each lift and allow it to become thumbprint hard before applying next lift. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to feather edge the mortar.
 4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
 5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
 - a. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
 - b. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.
 6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Remove mortar and repoint.
- F. Pointing with Sealant: Comply with Division 07 Section "Joint Sealants" and as follows:
1. After raking out, keep joints dry and free of mortar and debris.
 2. Clean and prepare joint surfaces. Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
 3. Fill sealant joints with specified joint sealant:
 - a. Install cylindrical sealant backing beneath the sealant. Where space is insufficient for cylindrical sealant backing, install bond-breaker tape.
 - b. Install sealant using only proven installation techniques that ensure that sealant is deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding masonry and matching the contour of adjoining mortar joints.
 - c. Install sealant as recommended in writing by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:
 - 1) Fill joints to a depth equal to joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.
 - d. Tool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant from surfaces adjacent to joint.
 - e. Sanded Joints: Immediately after first tooling, apply ground-mortar aggregate to sealant, gently pushing aggregate into the surface of sealant. Lightly retool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant and aggregate from surfaces adjacent to joint.
 - f. Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by

the means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.

- G. Maintain all existing weep holes. If repointing joint with existing weep holes, Contractor shall install rope to maintain weep holes, unless noted otherwise.
- H. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
 - 1. Use specified weep products to form weep holes.
 - 2. Space weep holes formed from plastic tubing 16 inches o.c.
 - 3. Trim wicking material flush with outside face of wall after mortar has set.
- I. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 28 days before beginning cleaning work.

3.4 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, applied by low-pressure spray.
 - 1. Do not use metal scrapers or brushes.
 - 2. Do not use acidic or alkaline cleaners.
- B. Clean adjacent non-masonry surfaces. Use detergent and soft brushes or cloths.
- C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- D. Remove masking materials, leaving no residues that could trap dirt.

3.5 FIELD QUALITY CONTROL

- A. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.
- B. Notify Architect's Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until Architect's Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

END OF SECTION 040323

SECTION 040342 – HISTORIC MASONRY REPAIR

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 historic treatment work consisting of repairing historic stone assemblies as follows:
 - 1. Repairing granite masonry including non-structural crack repair and, pinning, patching and epoxy repair.
 - 2. Removing existing abandoned anchors and patching masonry.
 - 3. Resurfacing (tooling) exterior surfaces of granite masonry units to remove loose material and allow for positive drainage.
- B. Related Requirements:
 - 1. Section 013591 "Historic Treatment Procedures."
 - 2. Section 024119 "Selective Demolition."
 - 3. Section 040310 "Historic Masonry Cleaning" for cleaning of masonry.
 - 4. Section 040343 "Historic Masonry Repointing" for repairing of existing mortar joints.
 - 5. Section 076200 "Sheet Metal Flashing and Trim" for metal flashing installed in or on repaired stonework.

1.3 DEFINITIONS

- A. Low-Pressure Spray: 100 to 400 psi.
- B. Face Bedding: Setting of stone with the rift or natural bedding planes (strata) vertical and parallel to the wall plane rather than horizontal or "naturally bedded," which holds bedding planes together by gravity.
- C. Revise "Rebuilding (Setting) Mortar" Paragraph below to suit local usage and office practice.
- D. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.
- E. Rift may be obscure in igneous rocks such as granite. Often, it is obvious as with bedding planes in many sedimentary stones.
- F. Rift: The most pronounced direction of splitting or cleavage of a stone.
- G. Stone Terminology: ASTM C 119.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to stone historic treatment and repair.
 - 2. Review methods and procedures related to repairing historic stone masonry including, but not limited to, the following:
 - a. Verify historic treatment specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.
 - c. Quality-control program.
 - d. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

- A. Order replacement materials at earliest possible date to avoid delaying completion of the Work.
- B. Order sand and blend of white/gray portland cement for pointing mortar immediately after approval of mockups. Take delivery of and store at Project site a sufficient quantity to complete Project.
- C. Work Sequence: Perform stone historic treatment work in the following sequence, which includes work specified in this and other Sections:
 - 1. Remove any existing plant growth.
 - 2. Inspect for open mortar joints and repair before washing to prevent the intrusion of water and other cleaning materials into the wall.
 - 3. Retool spalled stone.
 - 4. General masonry cleaning.
 - 5. Rake out mortar from joints surrounding stone to be replaced and from joints adjacent to stone repairs along joints.
 - 6. Sound stones.
 - 7. Injection grouting of loose and/or hollow stones.
 - 8. Repair stonework, including replacing existing stone with new stone. If required, repair backup masonry.
 - 9. Rake out mortar from joints to be repointed.
 - 10. Point mortar joints.
 - 11. After repairs and repointing have been completed and cured (allow for 28 day cure time prior to final cleaning), perform a final rinse of the building using low-pressure water to remove residue(s) from this work.
- D. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in stone according to "Stone Patching" Article. Patch holes in mortar joints according to Division 04 Section "Historic Masonry Repointing."

1.6 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include recommendations for product application and use. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, sections, and locations of stone repair work on the structure.
2. Indicate complete dimensions for new stone units and their jointing, showing relation of existing to new units.
3. Show partial replacement stone units (dutchmen).
4. Propose the sequence of stone removal and reinstallation, for any scheduled repair.
5. Indicate setting number of each new stone unit and its location on the structure in annotated plans and elevations.
6. Identify any requirements (in terms of kind, size, color and pattern) for composite patch material repair.
7. Show provisions for expansion joints or other sealant joints.
8. Show provisions for flashing, lighting fixtures, conduits, and weep holes as required.
9. Show replacement and repair anchors, including drilled-in pins. Include details of anchors within individual stone units, with locations of anchors and dimensions of holes and recesses in stone required for anchors, including direction and angle of holes for pins.

C. Samples for Initial Selection: For the following:

1. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of stone representative of the range of masonry colors on the building.
 - a. Have each set contain a close color range of at least three (3) samples of different mixes of patching compound that matches the variations in existing stone when cured and dry.
2. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For the following:

1. Each type of replacement stone. Include sets of Samples to show full range of color, texture, grain, veining, and finish to be expected. Provide sets of at least three (3) 12-by-12-inch Samples for each type, but no fewer than necessary to indicate full range and the proportion of variations within range.
2. Each type of adhesive.
3. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor Qualifications Data: Submit documentation of the qualifications of the Contractor, and of any Sub-Contractor(s) to the Contractor, as specified in Article "Quality Assurance."
1. Qualifications Data shall be prepared by the Contractor or Sub-Contractor proposing to perform the specified Work.
 2. Qualification data for persons who will be completing the work to demonstrate their capabilities and experience. Include a list of completed projects with names of persons involved.

- B. Quality-control program.
- C. Stone Preservation Work Plan: Submit documentation as specified in Article, "Quality Assurance."
- D. Repair Mortar Manufacturer Certification: Submit documentation as specified in Article, "Quality Assurance."
 - 1. Submit written training certificates from the repair mortar Manufacturer.
 - 2. Submit written verification that all specified items will be used. Including purchase orders, shopping tickets, receipts, etc. to prove that the specified materials were ordered and received
- E. Existing Conditions Photographs or Video: Submit before Work begins. Refer to Division 01 Section "Photographic Documentation."

1.8 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: The Work in this Section requires specialized training and experience working with sensitive historic and cultural properties. The Owner requires qualified and capable Contractors and sub-contractors who have the skill, experience and qualifications to perform the Work.
 - 1. The Contractor or sub-contractor to the Contractor shall have not less than five (5) years successful experience in masonry restoration and repointing; shall employ on this project personnel skilled in the restoration processes and operations indicated; and shall have successfully completed not less than three (3) masonry restoration projects of a similar scope and general requirements of this project in the last five (5) years. Experience installing standard unit masonry or new stone masonry is not sufficient experience for stone restoration work.
 - 2. These projects shall be identified on the bid form. The projects shall be similar in scope and general requirements to this project. Similar scope shall be defined in general as having similar major components of this project such as finish stone cleaning and restoration, repointing of existing masonry, repair of masonry, experience working with composite patching materials, and similar historic properties, and other restoration specialties. The work on the submitted projects shall have been completed in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties. At least one (1) of the projects shall have been reviewed by a State Historic Preservation Office within the last five (5) years, or subject to historic preservation compliance review by a local or county review board.
 - 3. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that stone restoration and cleaning work is in progress. Supervisors shall not be changed during Project except for causes beyond control of restoration specialist firm.
 - 4. Projects listed as evidence of a Contractor's qualifications shall have been managed and/or executed by personnel employed by the firm submitting evidence of qualifications Sub-Contractors to the Contractor submitting projects shall submit projects which were executed by their own personnel in the last five (5) years.
 - 5. The company proposing to perform Work requiring qualifications as specified in this Section shall be considered as a firm part of the bid. Substitution after the Award of Contract can only be made subject to the Architect's and Owner's review and approval of new Qualifications Data by the proposed substitute company. Substitutions for key persons identified on the Qualifications Data will be subject to review and approval at the discretion of the Architect and Owner.

6. As part of the evaluation of qualifications, the Architect and/or Owner may determine that the Contractor or Subcontractor has established on previous project(s) (whether federal, state, municipal, or commercial), a record of unsatisfactory work or a repeated failure to complete contracts awarded to them within the contract time, or that the Contractor or Sub-Contractor has failed to meet the specified qualification requirements, which may be the basis for rejection of the Contractor or Sub-Contractor.
 7. Failure on the part of a Contractor to provide complete Qualifications Data required herein within the required time may result in the Contractor being found non-responsive and may be grounds for rejection of its bid.
 8. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing.
- B. Repair Mortar Manufacturer Certification: In order to use composite patching material specified, the Contractor and all installers of the repair mortar shall have successfully completed the training or retraining workshop for installation of the mortar within the last five (5) years, and have at least three (3) years of experience in successful stone patching. A three-day workshop for installers of Jahn Restoration Mortars is offered by Cathedral Stone Products, Inc, 7266 Park Circle Drive, Hanover, Maryland, 21076, 800-684-0901, 800-684-0904 (FAX).
- C. Stone Preservation Work Plan: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of restoration work including protection of surrounding materials and Project site for the Work of this Section.
1. Coordinate the protection plan of the Project area and adjacent property during operations with the stone preservation work plan. Refer to Division 01 Section "Temporary Facilities and Controls."
 2. As part of the Stone Preservation Work Plan, coordinate an access plan, which describes in detail the materials, methods, access equipment and other equipment to be used for each phase of the Work of this Section. Refer to Division 01 Section "Temporary Facilities and Controls."
 3. The Contractor shall prepare Stone Preservation Work Plan Shop drawings identifying each extent of work on each façade; Refer to Part 1 Article, "Action Submittals."
- D. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising worker performance and preventing damage.
- E. Mockups: Prepare mockups of historic treatment to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.
1. General:
 - a. Prepare sample areas for each type of stone indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than two (2) adjacent whole units in least dimension. Construct sample areas in locations in existing walls where directed by Architect unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work.
 - b. Samples shall be redone as many times as necessary to the satisfaction of the Architect at no additional cost to Owner.
 - c. More than one category of treatment can be exhibited in a sample, if each work item is clearly labeled.

- d. Obtain the Architect's approval before proceeding with the Work. Retain acceptable samples or sample panels in an undisturbed condition, suitably marked, during construction as a standard for judging the completed Work.
2. Stone Repair: Include the following as a minimum:
 - a. Cracks
 - 1) Each field sample shall include sounding the stone prior to completing the repair.
 - 2) Each field sample shall include a minimum of six lineal feet (6 lf) of representative crack filling and repair.
 - 3) Field samples for crack treatment shall include, but not be limited to:
 - a) Non-structural crack repairs;
 - b) Structural crack repairs.
 - b. Losses:
 - 1) The field samples shall include a minimum of two (2) of each type of repair.
 - 2) Field samples for loss treatment shall include, but not be limited to:
 - a) Installation of the repair mortar at losses in the stone.
 - b) Blind-pin repair in stone.
 - c) Removal and resetting stone.
 - d) Removal and setting new stone (Dutchman) and exterior masonry units.
 - c. Tooling and Redressing:
 - 1) The field samples shall include a minimum of two (2) of each type of repair indicated in the Drawings at the following conditions.
 - a) Spalled stone surface.
 - b) Bonded and/or incipient spalls at stone surface.
 - c) Delamination at stone.
 - 2) Field samples shall include the retooling or redressing of the stone surface in order to restore the original texture and finish of the stone. Contractor to complete samples using hand tools only – no pneumatic equipment will be allowed.
 - d. Replacement:
 - 1) The field samples shall include a minimum of two (2) representative unit replacements.
 - e. Patching:
 - 1) Three (3) small holes at least 1 inch in diameter for each type of masonry indicated to be patched, so as to leave no evidence of repair.
3. Refer to Division-01 Section "Mockups" for additional mockups required as part of the Work.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

F. Preinstallation Conference: Conduct conference at Project site

1. Review methods and procedures related to stone restoration and cleaning including, but not limited to, the following:
 - a. Construction Schedule: Verify availability of materials, Restoration Specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.

G. Alternative Methods and Materials: If alternative methods and materials to those indicated in the Contract Documents are proposed for any phase of the Work of this Section, Refer also to Division 01 Section "Substitution Procedures."

1. Provide written description, including evidence of successful use on other comparable projects and program of testing to demonstrate effectiveness for use on this project, and submit for evaluation by the Architect.
2. Do not proceed with any substitutions without written approval of the Architect.

H. Cutting for Anchoring Devices: Holes and sinkages shall be cut in stones for all anchors and other tie-back devices per industry standard practice.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site strapped together in suitable packs or pallets or in heavy-duty crates and protected against impact and chipping.
- B. Deliver each piece of stone with code mark or setting number on unexposed face, corresponding to Shop Drawings, using nonstaining paint.
- C. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- E. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two (2) days.
- F. Store lime putty covered with water in sealed containers.
- G. Store sand where grading and other required characteristics can be maintained and contamination avoided.
- H. Handle stone to prevent overstressing, chipping, defacement, and other damage.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit repair work to be performed according to product manufacturers' written instructions and specified requirements.
- B. Temperature Limits, General: Repair stone units only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least seven (7) days after completion of the Work unless otherwise indicated.
- C. Cold-Weather Requirements: Comply with the following procedures for stone repair unless otherwise indicated:
 - 1. When air temperature is below 40 deg F, heat mortar ingredients, repair materials, and existing stone to produce temperatures between 40 and 120 deg F.
 - 2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F, within the enclosure for seven (7) days after repair.
- D. Hot-Weather Requirements: Protect stone repair when temperature and humidity conditions produce excessive evaporation of water from mortar and patching materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.
- E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.
- F. Protection of Finished Work: During construction, tops of walls shall be carefully covered at night, especially during any precipitation or other inclement weather.
- G. Protection of Adjacent Materials:
 - 1. Protect all existing adjacent materials and surfaces during the execution of the Work. Provide all necessary protection and work procedures to avoid damage to adjacent stonework, glass, ornamental metals, hard and soft landscape materials, sidewalks, utilities, equipment, and all other existing and new exterior materials, and assemblies.
 - 2. Repair all damage to adjacent materials caused by the execution of the Work of this section at no expense to Owner. Damaged materials shall be repaired or replaced by mechanics experienced in the respective type of work, to the satisfaction of the Architect.
 - 3. Prevent mortar, epoxy and sealant materials used in repointing and repair work from staining face of surrounding masonry and other surfaces. (Immediately remove mortar, epoxy and sealant materials in contact with exposed masonry and other surfaces). Protect sills, ledges and projections from mortar droppings.
 - 4. At all times, walls surrounding roof areas shall be adequately protected from droppings.
 - 5. Maintain a clean work area at all times. Clean up materials and equipment; sweeping clear the area of all debris matter. Clean-up shall occur minimally once a day at the end of each shift.

1.11 COORDINATION

- A. Coordinate stone restoration and cleaning with public circulation patterns at Project site. Some work is near public circulation patterns. Public circulation patterns cannot be closed off entirely,

and in places can be only temporarily redirected around small areas of work. Plan and execute the Work accordingly.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain each type of material for repairing historic masonry (stone, cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.
- B. Existing Materials: Re-use existing stone from the building, including:
 - 1. Sound portions of damaged material removed for and used for Dutchmen;
 - 2. If any stone pieces are removed from the building elevation, they shall be numbered and re-installed as part of this contract; and
 - 3. Any sound pieces of stone that cannot be re-installed shall be turned over to the Owner.

2.2 MASONRY MATERIALS

- A. Stone Matching Existing: Stone shall match color of the existing adjacent stone (when cleaned). Provide natural building stone of variety, color, texture, grain, veining, finish, size, and shape to match existing stone and with physical properties.
 - 1. For existing stone that exhibits a range of colors, textures, grains, veining, finishes, sizes, or shapes, provide stone that proportionally matches that range rather than stone that matches an individual color, texture, grain, veining, finish, size, or shape within that range.
- B. Quarrying New Stone: Have quarry clearly label the direction of rift or bedding planes when rough stone is quarried, to facilitate cutting stones so that natural bedding planes are as required in "Cutting New Stone" Paragraph.
- C. Cutting New Stone: Regardless of how existing stone was cut and set, cut each new stone so that, when it is set in final position, it is naturally bedded (unless otherwise required for structural purposes or as directed by Architect).
- D. Salvaged Stone: Obtain from location(s) indicated on Drawings. Clean off residual mortar.
- E. Building Brick: Brick for backup at stone wall rebuilding, according to ASTM C 62 Grade SW, unless otherwise noted. Brick shall require cutting where stone walls are battered. Refer to Division 04 Section "Unit Masonry."

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I; both gray and white where required for color matching of mortar.
 - 1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

- B. Hydrated Lime: ASTM C 207, Type S.
- C. Factory-Prepared Lime Putty: ASTM C 1489.
- D. Quicklime: ASTM C 5, pulverized lime.
- E. Mortar Sand: ASTM C 144 unless otherwise indicated.
 - 1. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
 - 2. Colored Mortar: Provide natural sand, or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
 - a. As noted in Division 04 Section "Historic Masonry Repointing," there are several different masonry types requiring repointing and the mortar color varies across the building exterior.
 - b. Refer to Specification Section for additional information.
 - 3. For exposed mortar, provide sand with rounded edges.
 - 4. Do not use admixtures of any kind in mortar, unless otherwise indicated or directed.
 - 5. Toning pigments for filling and pointing mortar shall be selected on the basis of approved field samples and must be alkali stable mineral pigments.
- F. Water: Potable, free from injurious amounts of oil, soluble salts, alkali, acids, organic impurities, and other deleterious materials.

2.4 STONE ANCHORS AND PINS

- A. At horizontal pin locations provide 1/4" diameter threaded stone pins unless otherwise indicated on Drawings of Stainless Steel, AISI Type 316 with wire mesh screen as shown on drawings by Hilti, Simpson or equivalent.
- B. At vertical pin locations at coping stones, provide 3/8" diameter S.S. pins with 3" embedment into top and bottom stone. By Heckmann Building products or equivalent.

2.5 MANUFACTURED REPAIR MATERIALS

- A. Stone Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching stone.
 - 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. Cathedral Stone Products, Inc.; Jahn Restoration Mortars.
 - b. Edison Coatings, Inc.; Custom System 45.
 - c. Keim Mineral Coatings of America, Inc.; Restauro Stone and Masonry Repair Mortars.
 - 2. Formulate patching compound in colors, textures, and grain to match stone being patched. Provide no fewer than ten (10) custom colors to enable proper stone matching of existing stone colors on this project. Stone color/texture will vary from stone to stone and the Contractor shall be required to modify the color and texture to match each and every repair location on a stone-by-stone basis. If after the patch has cured and the color does not

- match, the Architect will review to determine if the patch is to be removed and reinstalled or can be stained with "MasonRE" manufactured by Cathedral Stone, or approved equal.
3. Use formulation that is vapor- and water permeable (equal to or more than the stone), frost and salt resistant, shrink resistant, has lower modulus of elasticity than the stone units being repaired, and develops high bond strength to all types of stone. Patch material shall be physically compatible with the substrate, including but not limited to porosity, tensile and compressive strength.
 4. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
 5. The cementitious composite repair patching material shall be premixed and formulated to match the color and texture of the existing cleaned masonry that does not contain any acrylic, latex, or other synthetic polymer additives.
 6. Water: Potable and filtered per requirements of this section.
- B. Cementitious Crack Filler: An ultrafine superplasticized grout that can be injected into cracks, is suitable for application to wet or dry cracks, exhibits low shrinkage, and develops high bond strength to all stone types.
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. Cathedral Stone Products, Inc.; Jahn Injection Grout.
 - b. Edison Coatings, Inc.; Pump-X 53-Series.
- C. Stone-to-Stone Adhesive: Two-part polyester or epoxy-resin stone adhesive with a 15- to 45-minute cure at 70 deg F, recommended in writing by adhesive manufacturer for type of stone repair indicated, and matching stone color.
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. Two-Part Polyester or Epoxy-Resin Stone Adhesive:
 - 1) Edison Coatings, Inc.; Flexi-Weld 520T.
 - 2) Akemi Akepox adhesives distributed by Wood and Stone, Inc.
 - 3) Sika Corporation, Sikadur 31 Hi-Mod Gel.
 - 4) Rezi-Weld Gel Paste or Rezi-Weld LV.
 - 5) Euclid Chemical Company, Euco #452 Epoxy System.
 - 6) ITW Red Head Epcon A7
 - b. One-Part Cementitious Stone Adhesive:
 - 1) Cathedral Stone Products, Inc.; Jahn Restoration Adhesive.
 - 2) Or approved equal.

2.6 ACCESSORY MATERIALS

- A. Stone Anchors, Pins and Shelf Angles: Type and size indicated or, if not indicated, to match existing anchors in size and type. Fabricate anchors and pins from Type 316 stainless steel, unless indicated otherwise.

- B. Setting Buttons and Shims: Resilient plastic, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units, less the required depth of pointing materials unless removed before pointing.
- C. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.
- D. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:
 - 1. Previous effectiveness in performing work involved.
 - 2. Minimal possibility of damaging exposed surfaces.
 - 3. Consistency of each application.
 - 4. Uniformity of the resulting overall appearance.
 - 5. Do not use products or tools that could do the following:
 - a. Remove, alter, or harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in contract.
 - b. Leave residue on surfaces.

2.7 MORTAR MIXES

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume not by weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
 - 1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.
- B. Do not use admixtures in mortar unless otherwise indicated.
- C. Mortar Proportions: Mix mortar materials in the following proportions:
 - 1. Rebuilding (Setting) Mortar for stone: Comply with ASTM C 270, Proportion Specification, Type N composed of 1 part Portland cement, 1 part mason's lime, and 6 parts sand mixed with potable water.
- D. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
 - 1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.

2.8 TOOLING EQUIPMENT

- A. Hand tools: Hammer and chisels.

- B. Carborundum, brick or stone.

2.9 DUTCHMAN REPAIRS

- A. Carve and cut decorative surfaces to match existing components at Dutchman repairs. Repairs to match existing adjacent stone unit in color, texture, profile, veining and tooling. Stone color/texture will vary from stone-to-stone and the Contractor shall be required to match as closely as possible each and every location where a repair location is identified and located, on a stone-by-stone basis. If a suitable Dutchman that matches in color and texture cannot be found, the Architect will review to determine if the Dutchman is to be stained with "MasonRE" manufactured by Cathedral Stone, or approved equal.
- B. Clean backs of stone to remove rust stains, iron particles, and stone dust.

PART 3 - EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, provide historic stone repair by a firm that has no less than ten (10) years of experience with similar masonry conditions.

3.2 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from stone restoration work.
 - 1. Install and maintain protection for architectural and site features including, but not limited to, steps, paving stones, benches, walls, doors, windows, railings, light fixtures, signs, utilities, and trees and other soft landscape features. Protection methods shall be per the final version of the Work Plan as approved by the Architect.
 - 2. Install temporary facilities and pedestrian passage including work area enclosures and temporary signage. Erect temporary protection over main doors into building and other entrances as indicated on the drawings and at points of entrance and protection for construction traffic that must remain in operation during course of masonry restoration.
 - 3. No work shall commence until all Quality Requirements stated in Division 01 Section "Quality Requirements" are fulfilled.
- B. Prevent mortar from staining face of surrounding stone and other surfaces.
 - 1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
 - 2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
 - 3. Immediately remove mortar splatters in contact with exposed masonry and other surfaces.
 - 4. Clean mortar splatters from scaffolding at end of each day.
- C. Remove downspouts and associated hardware adjacent to immediate work area and store during stone repair work. Reinstall when repairs are complete. Existing built-in gutters shall be protected for duration of work.

1. Provide temporary rain drainage during work to direct water away from building.

D. Disposal of wash down materials:

1. It is the Contractor's sole responsibility to collect, package and dispose of materials used in the cleaning and wash down process. Dispose of particles and run-off from cleaning and restoration operations by legal means and in a manner which prevents undermining of pavement and foundations, damage to adjacent buildings fabric, and water penetration into the building interiors. Disposal shall be in accordance with regulations enacted by appropriate governmental agencies, Authorities Having Jurisdiction.
2. Refer to Division 04 Section "Historic Masonry Cleaning" for additional wash down and disposal requirements.

3.3 STONE REPAIR, GENERAL

- A. Repair Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 10 feet away by Architect.

3.4 ABANDONED ANCHOR REMOVAL

- A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items no longer in use unless indicated to remain.
1. Remove items carefully to avoid spalling or cracking masonry.
 2. Notify Architect before proceeding if an item cannot be removed without damaging surrounding stone; do the following where directed:
 - a. Cut or grind off item approximately 3/4-inch beneath surface and core drill a recess of same depth in surrounding stone as close around item as practical.
 - b. Immediately paint exposed end of item with two (2) coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.
 3. Patch and/or plug the hole where each item was removed unless directed to remove and replace the stone unit.

3.5 CRACK TREATMENT - STRUCTURAL

A. Definitions:

1. Crack requiring structural repair: A crack where the fractured stone is loose when sounded or can be removed in whole or in part, reducing the stability or performance of a stone element

B. Design Intent. The objectives of the Work of this Article include:

1. Repair of existing cracks using structural repairs with blind-pins or countersunk face pins and with adhesive using injection ports.

C. Crack repair with pins and injection grout:

1. Clean out all debris from the crack. Sound stone with rawhide or rubber mallet. If stone has become displaced, Contractor shall re-align stone before installing stainless steel pin(s) without damaging or cutting stone. Prior to installing the pins, the Contractor shall sound the stone to determine if there are any voids behind the stone. The Contractor shall include in the base bid that 15 percent of the stones where cracks are indicated will sound hollow when sounded and will require injection grouting as part of the structural crack repair. If the stone is loose, the Contractor shall remove the stone and re-install the piece of stone using countersunk stainless steel pins to secure the stone as described below in procedures for installation of a stone Dutchman. The reset stone shall be set with mortar at bedding and joints and epoxy at cracked edge.
2. Contractor shall carefully drill hole(s) in the stone to secure the loose piece of stone. The loose stone shall be secured with the number of pins indicated on the drawings at each location. The countersunk pins shall be set with epoxy. A minimum of two (2) pins is required at each location unless noted otherwise.
3. The length of the pins will vary, but they are typically 6 to 8 inches long. The pins should be installed in a cross-pinning fashion, so that the loose stone fragment cannot detach from the host stone and set in the host stone a minimum of 4 inches and countersunk a minimum of 1/2"-1" from the face of stone.
4. After installing the pins and allowing the epoxy to cure, the pin holes shall be repaired with composite patch material custom colored to match the host stone. At the stones that sounded hollow and after installing the pins to secure the stones, the Contractor shall complete injection grouting of the stone unit.
5. Workmanship:
 - a. Grout workmanship shall comply with all applicable recommendations of the material manufacturer's written specifications and requirements except as modified in the Contract Documents.
 - b. Do not add any bonding agents, accelerators, or retarders to the grout without prior written review from the Architect.
 - c. Discard all grout that has hardened or exceeded its allowable pot life after mixing. Provide separate, clearly labeled containers for discarded grout; remove discarded material from the staging as soon as practical.
 - d. Preparation for Grouting:
 - 1) Transverse Cracking: For crack across the face of the masonry unit, drill a series of holes approximately 1/4" in diameter through the heart of the transverse crack with a distance of approximately 5 to 6 inches between centers. The holes should be drilled on an angle sloping down.
 - 2) Lateral Cracking: For masonry with cracks parallel to the face of the masonry unit, create a "drill frame" by drilling 1/4" diameter holes at a downward angle at a distance of approximately 10 inches between centers, both horizontally and vertically.
 - e. Mixing Grout:
 - 1) Jahn M30 by Cathedral Stone Products, or approved equal (for cracks less than 3/16"): Add approximately 2 to 3 parts powder to 1 part water. Mix the components using an electric drill with a paddle or hand mixer at a speed of approximately 3,000 rotations per minute for several minutes until a frothy consistency is obtained. The material should be mixed for a minimum of ten (10) minutes. Stir the grout just before injection to redistribute any cement that has settled.

- 2) Jahn M40 by Cathedral Stone Products, or approved equal (for cracks greater than 3/16"): Add approximately 1 part water to 2-2½ parts cement, by volume and mix. Stir grout just before injection to distribute any cement that might have settled.

f. Injection Procedure:

- 1) Clean out cracks and drill holes using compressed air where possible, and potable water before injecting the grout; remove all dirt and organic matter, loose material, sealants and failed epoxies.
- 2) Drill holes, as outlined above to a minimum depth of 2 inches at centerline of crack. Where possible drill holes at mortar joints. Flush the drill holes and crack with potable water before beginning the injection procedure.
- 3) Set plastic injection ports in holes. Apply clay filler to face of crack, leaving opening at upper end of crack for air release.
- 4) The openings of the cracks between the drilled holes should be sealed using clay or any nonstaining removable plug to prevent the injection grout from leaking. The hole of the injection apparatus should be connected to the first drill hole from the bottom. Inject the grout into the hole until it begins flowing back out the drill hole, and the drill hole directly above indicating that a crack has been filled. Seal the drill holes using clay or any nonstaining removable plug. Repeat procedure until the last drill hole is filled with grout.
- 5) For all cracks, fill surface of crack to a depth equal to three (3) times the crack width, allowing ports at the highest point in crack to be open for air release.
- 6) Where an excessive quantity of grout is absorbed by the masonry, cease injection process and notify the Architect immediately for direction.
- 7) Clean any grout residue from the masonry surrounding the injection ports and adjacent area by sponging the area as many times as necessary with clean water. This should be done immediately, before the material sets.

g. Finishing

- 1) After the grout has set up remove the clay or other material and clean the surface of the stone. The drill holes and the surface of the crack, where applicable, should be filled and finished with the specified composite patching material custom colored to match the color and texture of the surrounding masonry.
- 2) The mortar should be allowed to set; it should be scraped, finished, and dampened to cure according to the manufacturers printed instructions.
- 3) After completing the injection grouting and pinning the stone, the contractor shall repair the crack as noted below.

D. Crack repair with composite patch material

1. Cut out crack using dremel tool for the full length and expanse of the crack. Crack shall be cut out to a depth back to sound stone but not less than 1/2" deep.
2. Install composite patch material per manufacturer's instructions in the cut out area. Color of material shall match the host stone
3. Clean cementitious material from face of stone before it sets by scrubbing with water. Tool surface of material to match the host stone

3.6 CRACK TREATMENT – NON-STRUCTURAL

A. Definitions:

1. Crack requiring non-structural repair: A crack without apparent immediate potential for reducing the stability or performance of a stone element.

B. Design Intent. The objectives of the Work of this Article include:

1. Repair of existing cracks using non-structural repairs using composite patch material.

C. Crack repair:

1. Cut out crack using dremel tool for the full length and expanse of the crack. Crack shall be cut out to a depth back to sound stone not less than 1/2" deep.
2. Install mortar in the cut out area. Color of material shall match the host stone.
3. Clean mortar from face of stone before it sets by scrubbing with water. Tool surface of material to match the host stone.

3.7 STONE REMOVAL AND REPLACEMENT

- A. At locations indicated, remove stone that is damaged or is to be reused. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

- B. Erect temporary bracing and supports as required to prevent the collapse of materials being removed.

- C. At walls, dismantle top edge and sides before removing wall. Stop removal work and immediately inform Architects if any structural elements above or adjacent to the work show signs of distress or dislocation during any Phase of removal work.

- D. During removals, maintain the stability of the partially remaining wall.

- E. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition. Coordinate with new flashing, reinforcement, and lintels, which are specified in other Sections.

- F. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, loose units in existing stone or unit masonry backup, rotted wood, rusted metal, and other deteriorated items.

- G. Remove in an undamaged condition as many whole stone units as possible.

1. Remove mortar, loose particles, and soil from stone by cleaning with hand chisels, brushes, and water.
2. Remove sealants by cutting close to stone with utility knife and cleaning with solvents.
3. Store stone for reuse. Store off ground, on skids, and protected from weather.
4. Deliver cleaned stone not required for reuse to Owner unless otherwise indicated.

- H. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for stone replacement.

- I. Replace removed damaged stone with other removed stone and salvaged stone in good condition, where possible. Replace with new stone matching existing stone where indicated. Do not use broken units unless they can be cut to usable size.
- J. Rift: Do not allow face bedding of stone. Before setting, inspect to verify that each stone has been cut so that, when it is set in final position, the rift or natural bedding planes are predominantly horizontal except for arches, where bedding planes are predominantly radial or vertical, but perpendicular to the wall. Reject stone with vertical bedding planes except as required for arches, lintels, and copings.
- K. Install replacement stone into bonding and coursing pattern of existing stone. If cutting is required, use a motor-driven saw designed to cut stone with clean, sharp, unchipped edges. Finish edges to blend with appearance of edges of existing stone.
 - 1. Maintain joint width for replacement stone to match existing joints.
 - 2. Use setting buttons or shims to set stone accurately spaced with uniform joints.
 - 3. Hold buttons back from face of stone a distance at least equal to width of joint, but not less than depth of pointing materials.
 - 4. Lead or plastic setting pads shall be placed under heavy stones in same thickness as joint and in sufficient quantity to avoid squeezing mortar out.
 - 5. Heavy stones or projecting courses shall not be set until mortar in courses below has hardened sufficiently to avoid squeezing.
 - 6. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.
 - 7. Support and brace projecting stones until wall above is in place and mortar has set.
 - 8. Execute stone re-installation by skilled mechanics and employ skilled stone fitters at Project site to do necessary field cutting if required.
- L. Set replacement stone with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter vertical joints for full width before setting and set units in full bed of mortar unless otherwise indicated. Replace existing anchors with new anchors.
 - 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing stonework.
 - 2. Rake out mortar used for laying stone before mortar sets according to Section 040343 "Historic Masonry Repointing. Point at same time as repointing of surrounding area.
 - 3. Collar joints shall be grouted solid and well consolidated with high-slump ("Fine," as defined by ASTM C476). Contractor shall not slush collar joints.
 - 4. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.
- M. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
 - 1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Mortar shall be fully-bonded to adjacent masonry along its entire length. Completely remove such mortar and repoint.

3.8 PAINTING STEEL UNCOVERED DURING THE WORK

- A. Notify Architect if steel is exposed during stone removal. Where Architect determines that it is structural, or for other reasons cannot be totally removed, prepare and paint steel as follows:

1. Surface Preparation: Remove paint, rust, and other contaminants according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning," as applicable to comply with paint manufacturer's recommended preparation.
 2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).
- B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than 1/16 inch, notify Architect before proceeding.

3.9 DUTCHMAN REPAIR

- A. Remove defective portion of existing stone unit (backing stone). Carefully remove defective portion of stone by making vertical and horizontal saw cuts at face of backing stone and removing defective material to depth required for fitting partial replacement (Dutchman).
1. Make edges of backing stone at cuts smooth and square to each other and to finished surface; essentially rectangular. Make back of removal area flat and parallel to stone face.
 2. Do not overcut at corners and intersections. Hand trim to produce clean sharp corners with no rounding and no damage to existing work to remain.
 3. If backing stone becomes further damaged, remove damaged area and enlarge partial replacement as required.
- B. Remove mortar from joints that abut area of stone removal to same depth as stone was removed. Remove loose mortar particles and other debris from surfaces to be bonded and surfaces of adjacent stone units that will receive mortar by cleaning with stiff-fiber brush.
- C. Cut and trim partial replacement to accurately fit area where material was removed from backing stone. Fabricate to size required to produce joints between partial replacement and backing stone of no more than 1/16 inch in width, and to produce joints between partial replacement and other stones that match existing joints between stones. Cut partial replacement so that, when it is set in final position, natural bedding planes match the orientation of bedding planes of the backing stone unless otherwise indicated.
- D. Pinning: Before applying adhesive, prepare for mechanical anchorage consisting of 1/4-inch-diameter, stainless-steel pins set into 1/4-inch-diameter holes drilled at a 45-degree downward angle through face of partial replacement and into backing stone. Center and space pins between 3 and 5 inches apart and at least 2 inches from any edge. Insert pins at least 2 inches in backing stone and 2 inches in partial replacement with end countersunk at least 3/4 inch from exposed face of partial replacement.
- E. Concealed Pinning: Before applying adhesive, prepare for concealed mechanical anchorage consisting of 1/4-inch-diameter, stainless-steel pins set into 1/4-inch-diameter holes drilled into backing stone and into, but not through, the partial replacement. Center and space pins between 3 and 5 inches apart and at least 2 inches from any edge. Insert pins at least 2 inches in backing stone and 2 inches in partial replacement, but no closer than 3/4 inch from exposed face of partial replacement.
- F. Apply stone-to-stone adhesive according to adhesive manufacturer's written instructions. Coat bonding surfaces of backing stone and partial replacement, completely filling all crevices and voids.

- G. Apply partial replacement while adhesive is still tacky and hold securely in place until adhesive has cured. Use shims, clamps, wedges, or other devices as necessary to align face of partial replacement with face of backing stone.
- H. Clean adhesive residue from exposed surfaces and patch chipped areas and exposed drill holes.

3.10 STONE PLUG REPAIR

- A. Remove cylindrical piece of damaged stone by core-drilling perpendicular to stone surface.
- B. Prepare a replacement plug by core-drilling replacement stone. Use a drill sized to produce a core that fits into hole drilled in damaged stone with only minimum gap necessary for adhesive. Cut and install plug so that, when it is set in final position, natural bedding planes match the orientation of bedding planes of the backing stone unless otherwise indicated.
- C. Apply stone-to-stone adhesive according to adhesive manufacturer's written instructions. Coat bonding surfaces of existing stone and plug, completely filling all crevices and voids.
- D. Apply plug flush with surrounding stone while adhesive is still tacky and hold securely in place until adhesive has cured.
- E. Clean adhesive residue from exposed surfaces.

3.11 STONE PATCHING

- A. Patch the following stone units unless another type of repair or replacement is indicated:
 - 1. Units indicated to be patched.
 - 2. Units with holes.
 - 3. **Do not patch new stone, provide new stone to replace chipped or damaged stone.**
- B. Where indicated or directed, repair stone by installation of composite patch material to repair stone. Repair spalls, holes or losses with specified composite patching mortar according to the manufacturers printed instructions. Composite patch material is to match color, texture, profile, configuration and tooling of adjacent existing stone at each location.
- C. Preparation:
 - 1. Prior to cutting original material. Review location of all composite patch repairs in the field with the Architect to review the extent of proposed stone removal.
 - 2. Cut back existing unstable stone to sound material
 - 3. Carefully saw cut/chisel edge of existing stone smooth to receive new patch repair. Bevel edges to form a key. Do not chip or damage existing adjacent stone surfaces.
 - 4. Chisel or drill inside edges of loss to remove all loose mortar, masonry, dirt and residue. Cut back existing spalled stone to sound material to provide a minimum depth of 1/2 inch. Sound masonry with a hammer to verify its integrity. Chamfer edge of masonry to form a

key to receive the patch. Do not overcut corners; stop short of corner and chip out remainder by hand without damaging surrounding masonry.

5. Roughen the substrate surface as necessary to achieve the surface roughness specified by manufacturer for good bond, but do not damage the substrate surface.

D. Application of Patching Material:

1. Apply the Mortar Mix using a trowel in a series of lifts with no waiting period or scratch coat necessary between layers, up to a total maximum thickness of 3". For patches thicker than 3", apply mortar in two (2) layers, allowing the first layer to cure for a while before applying the second layer. If a cement skin forms, scrape approximately 1/16" of mortar off, dampen the first layer before applying second layer. Use light pressure during the applications. Work mortar firmly into the surface of the masonry, including the corners and under and around all mechanical anchors. Holes and losses to be packed solid with composite patching material.
2. Build up patching material so that it is slightly above adjacent masonry. Allow 15 to 30 minutes to set slightly, (this will vary depending on the weather - much longer in cool weather) then scrape off excess material using a straight edge.
3. To obtain a smooth finish to match adjoining stone, extra water can be used in the mix and the finished patch can be trowelled or "floated" to match texture of contiguous stone. Do not feather edge of patch. Tool or carve as required to match profile, texture and configuration of existing adjacent stone surfaces. Tool stone to maintain joints if patched area is over two (2) stones wide.
4. Clean any mortar residue from area surrounding the patch by sponging as many times as necessary with clean water. This shall be done before patching material sets.

E. Patching of Spalls and/or Building Up Depressions to Shed Water:

1. Brush a thin slurry of repair mortar containing HTI powder into the cavity or fracture to key the repair.
2. After slurry has dried (1-2 hours), wet the cavity and knead and push appropriate repair mortar into place using fingers with as much pressure as possible. Do not apply more than 5-6 mm at one time. Use small tools to assist with the filling.
3. Do not allow each filling layer to dry too rapidly. Protect the area from direct sunlight and direct wind/breezes.
4. When the filling has dried, wet the cavity again and repeat step 2 until the cavity is fully filled.
5. Over-filled mortar can be trimmed with plastic spatulas. Texture the exposed surface with dry sponges, hessian pads, stencil brushes and/or plastic scrapers to match the adjacent stone texture.
6. No repairs shall be less than 1/2-inch thick. If the repair area is not at least 1/2-inch deep, Contractor shall notify Architect prior to proceeding with any repairs.

F. Finishing:

1. Lightly mist the patch with water to wet the entire surface of the finished patch approximately 30 minutes to 1 hour after completion on hot sunny days and approximately two (2) hours on cool or cloudy days. Time will vary with temperature and humidity.
2. Mist at least once a day, but as often as possible on the three (3) days following the patch installation. Install patch preferably on days when area will be available for misting during the next two (2) consecutive days. If this is not possible, cover patch with plastic, taped in place, and begin misting as soon as possible.
3. Tool the surface of the composite patch repair to resemble the appearance of weathered adjoining stone.

G. Clean-up:

1. Following installation of composite patching material, clean mortar splashes and smears from stone using clear water and natural fiber bristle brushes.
2. Rinse masonry surface of all surrounding stones to remove all run-off of the composite patch material.

H. Unacceptable patches are defined as those with hairline cracks or that show separation from stone at edges, and those that do not match adjoining stone in color or texture. Remove patches and refill to provide patches free of those defects.

3.12 STONE TOOLING

A. Design Intent: The objectives of the Work of this Article include:

1. Eliminate loose pieces of stone from continuing to deteriorate and to ensure positive drainage away from the interior of the building.
2. Perform dressing of small layers of loose exfoliated stone where indicated.
3. Tooling of loose delaminating minor surfaces and of scaling stone surfaces where indicated with tooling techniques to match the original finish of the stone

B. The Contractor is required to tool the surfaces of the stone where indicated at spalled stone, at open veins, cracks less than 1/16 inch and where directed by the Architect. The objective is to restore the original finish and texture of the stone and ensure that the water is draining away from the building.

C. Should the Contractor perceive significant risk of damage at any stage of the Work, it shall notify the Architect immediately and not proceed with the procedure in question until so directed by the Architect.

D. The Contractor shall tool the stone using hand tools – no pneumatic equipment will be allowed. The Contractor shall be required to use hammer and chisels, or rub the stone surface with a sawn piece of stone or Carborundum brick to remove loose material and generally smooth surface so that rainwater is directed away from the building stone and restore the original finish, color and texture of the stone.

3.13 DISPLACED STONE

A. Contractor shall sound stone and review results of sounding with Architect to determine if any scope of work is required.

B. If stone is determined to be unsecure, out-of-plane or otherwise unacceptable according to the Architect, Contractor shall carefully remove and re-install stone according to provisions previously outlined within this Section. Reset stone shall align with adjacent faces and result in consistent head and bed joint widths.

3.14 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed stone surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water applied by low-pressure spray.
 - 1. Do not use metal scrapers or brushes.
 - 2. Do not use acidic or alkaline cleaners.
- B. Clean adjacent non-stone surfaces. Use detergent and soft brushes or cloths.
- C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- D. Remove masking materials, leaving no residues that could trap dirt.
- E. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

3.15 FIELD QUALITY CONTROL

- A. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.
- B. Notify Owner and Architect's Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until Owner and Architect's Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.16 STONE-WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess stone materials are Owner's property.
- B. Stone Waste: Remove stone waste and legally dispose of off Owner's property.

END OF SECTION 040342

SECTION 050374 – HISTORIC DECORATIVE METAL REPLICATION

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. Replication and installation of historic decorative metal items and whole assemblies.
- B. Related Requirements:
 - 1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.
 - 2. Section 050383 "Historic Cast Iron Repair."
 - 3. Section 076200 "Sheet Metal Flashing and Trim" for additional information on copper fabrications and installation.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to replication and installation of historic decorative metal items and whole assemblies.
 - 2. Review methods and procedures related to replication and installation of historic decorative metal items and whole assemblies including, but not limited to, the following:
 - a. Historic treatment specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.
 - c. Fire-protection plan.
 - d. Decorative metal historic treatment program.
 - e. Coordination with building occupants.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include plans, elevations, and sections showing locations and extent of replication work, with enlarged details of replacement parts indicating materials, profiles, methods of attachment, accessory items, and finishes.
 - 2. Include field-verified dimensions and the following:

- a. Full-size patterns with complete dimensions for new decorative metal items and their jointing, showing relationship of existing items to new items.
- b. Templates and directions for installing anchor bolts and other anchorages.
- c. Identification of each new metal item and component and its location on the structure in annotated plans and elevations.
- d. Provisions for expansion, weep holes, and conduits as required for each location and exposure.
- e. Provisions for sealant joints if required.

C. Samples for Initial Selection: For the following:

1. Each type of decorative metal material and component.
2. Sealant materials.
3. Accessories to verify color selection.

D. Samples for Verification: Actual sample of finished fabrications and products:

1. Each type of new fabrication to be used for replacing existing or missing decorative metal. Provide minimum length and height required to show full profile pattern to be replicated, including all projecting elements to be attached to base profiles.
 - a. Existing samples for replication: Before fabricating replica items, submit the actual profiles from which new metal will be replicated, as salvaged or documented from existing cladding or cast iron substrates. Package and ship to prevent loss or damage, or make patterns available for inspection by Architect at fabrication plant.
 - b. New fabrication Samples: Contractor shall work with Architect to determine areas of fabrication to be submitted in sample form. Contractor shall assume a maximum of six (6) different profiles and configurations demonstrating shape, color, and texture of component, suitable and ready for installation. Fabricate after submittal of existing samples for fabrication has been approved.
2. Fittings and brackets.
3. Medallions.
4. Each type of exposed connection between components. Show method of finishing components at connections.
5. Sealant materials.
6. Accessories: Each type of anchor, accessory, and miscellaneous support in required finishes.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Statements: For historic treatment specialist.
- B. Decorative Metal Historic Treatment Program: For replicating historic decorative metal items and whole assemblies.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Existing samples for replication: Following completion of fabrication of cladding components, deliver one salvaged sample of each existing shape and size of component to Project site. Deliver to a location and at a time determined by Owner, to become property of Owner.

1. Deliver samples carefully packed, protected from dirt, moisture, and breakage so as to arrive in usable, undamaged condition and enable long-term storage and possible future use.

1.7 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic decorative metal fabrication and installation specialist. The Work in this Section requires specialized training and experience working with sensitive historic and cultural properties and extensive experience fabricating and installing custom copper fabrications to replicate existing highly decorative components. The Owner requires qualified and capable Contractors and sub-contractors who have the skill, experience and qualifications to perform the Work. Experience in installing and finishing new decorative metalwork is insufficient experience for historic decorative metal replication work.
1. The Contractor or specialist sub-contractor to the Contractor shall have not less than ten (10) years successful experience in historic decorative metal replication; shall employ on this project personnel skilled in the restoration processes and operations indicated
 2. The Contractor or specialist sub-contractor to the Contractor shall have successfully completed not less than three (3) projects in the last ten (10) years of a similar scope and general requirements of this project, including decorative copper replication and installation.
 3. These projects shall be identified on the bid form, including project information, contacts, and detailed, close-up photos of completed work. The projects shall be similar in scope and general requirements to this project, at similar historic properties, and involving coordination with other restoration specialties.
 - a. Similar scope shall be defined in general as having similar major components of this project, such as replication of existing decorative copper cladding with a similar level of detail as this property, and fabrication of new copper cladding to match existing profiles.
 - b. Representative projects shall be of a similar size and complexity as this project.
 - c. The work on the submitted projects shall have been completed in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties.
 - d. At least one (1) of the projects shall have been reviewed by a State Historic Preservation Office within the last five (5) years, or have been subject to historic preservation compliance review by a local or county review board.
 - e. Representative projects listed as evidence of a Contractor's qualifications shall have been managed and/or executed by personnel currently employed by the firm submitting evidence of qualifications.
 4. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that historic decorative metal work is in progress. Supervisors shall not be changed during Project except for causes beyond control of restoration specialist firm and with approval of the Owner and Architect.
 5. The company proposing to perform Work requiring qualifications as specified in this Section shall be considered as a firm part of the bid.
 - a. Substitution after the Award of Contract can only be made subject to the Architect's and Owner's review and approval of new Qualifications Data by the proposed substitute company. Substitutions for key persons identified on the Qualifications Data will be subject to review and approval at the discretion of the Architect and Owner.
 6. As part of the evaluation of qualifications, the Architect and/or Owner may determine that the Contractor or Subcontractor has established on previous project(s) (whether federal, state, municipal, or commercial), a record of unsatisfactory work or a repeated failure to complete contracts awarded to them within the contract time, or that the Contractor or

Sub-Contractor has failed to meet the specified qualification requirements, which may be the basis for rejection of the Contractor or Sub-Contractor.

7. Failure on the part of a Contractor to provide complete Qualifications Data required herein within the required time may result in the Contractor being found non-responsive and may be grounds for rejection of its bid.

- B. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing.
- C. Decorative Metal Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for historic treatment work, including each process or phase of replicating decorative metal, related work, and the protection of surrounding materials and Project site.
 1. If materials and methods other than those indicated are proposed for any phase of historic treatment work, add a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project.

1.8 MOCKUPS

- A. Prepare mockups of historic decorative metal replication and installation processes on existing surfaces to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation.
 1. **Contractor shall assume a maximum of six (6) different full-size mockups of each type of new fabrications to be used for replacing existing or missing decorative metal.**
 - a. Provide minimum length and height required to show full profile pattern, including all projecting elements to be attached to base profiles, and all transitions to adjacent materials.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Pack, deliver, and store decorative metal items in suitable packs, heavy-duty cartons, or wooden crates; surround with sufficient packing material to ensure that products are not deformed, cracked, or otherwise damaged.
- B. Store decorative metal inside a well-ventilated area, away from uncured concrete and masonry and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.
- C. Protect strippable protective covering on decorative metal from exposure to sunlight and high humidity, except to extent necessary for period of decorative metal installation.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with replication and installation of historic decorative metal items and whole assemblies only when existing and forecasted weather conditions are within environmental limits set by each manufacturer's written instructions and specified requirements.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. General: Provide decorative metal materials made of alloys, forms, and types that match existing metals and have the ability to receive finishes matching existing finishes unless otherwise indicated. Exposed-to-view surfaces exhibiting imperfections inconsistent with existing materials are unacceptable.
- B. Source Limitation for Replacement Materials: Obtain materials for replication of decorative metal items and whole assemblies from single source from single manufacturer with resources to provide materials of consistent quality in appearance and physical properties.
- C. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 or H01 temper; with non-patinated exposed mill finish.
 - 1. 20 oz./ sq. ft., unless otherwise noted.
 - 2. Acceptable Manufacturers:
 - a. Aurubis Buffalo, Inc.
 - b. Hussey Copper, Ltd.
 - c. Revere Copper Products, Inc.

2.2 PROTECTIVE COATING MATERIALS

- A. Refer to Division 07 Section "Cold Fluid Applied Waterproofing".

2.3 MISCELLANEOUS MATERIALS

- A. Underlayment Materials: Refer to Division 07 Section "Sheet Metal Flashing and Trim."
- B. Brazing Rods for Copper-Alloy Components: Type and alloy as recommended in writing by producer of metal to be brazed and as required for color match, strength, and compatibility in fabricated items.
- C. Fasteners of same basic metal as fastened metal unless otherwise indicated. Use metals that are noncorrosive and compatible with each metal joined.
 - 1. Match existing fasteners in material and in type of fastener unless otherwise indicated.
 - 2. Use concealed fasteners for interconnecting decorative metal components and for attaching them to other work unless exposed fasteners are the existing fastening method.
 - 3. Finish exposed fasteners to match finish of metal fastened unless otherwise indicated.
- D. Anchors: Use metals that are noncorrosive and compatible with each metal anchored.

- E. Solder: ASTM B32, 100 percent tin, with maximum lead content of 0.2 percent, as recommended by sheet metal manufacturer.
- F. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- G. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- H. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- I. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:
 - 1. Previous effectiveness in performing the work involved.
 - 2. Little possibility of damaging exposed surfaces.
 - 3. Consistency of each application.
 - 4. Uniformity of the resulting overall appearance.
 - 5. Do not use products or tools that could do the following:
 - a. Remove, alter, or in any way harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in the Contract.
 - b. Leave an unintended residue on surfaces.

2.4 DECORATIVE SHEET METAL FABRICATION

- A. Decorative Sheet Metal: Fabricate decorative metal items and components in sizes and profiles to match existing historic decorative metal or existing cast iron surfaces as indicated in the Drawings, with accurate curves, lines, and angles.
 - 1. Mill joints to a tight, hairline fit.
 - 2. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 3. Fabricate sheet metal cladding in shop to greatest extent possible.
 - 4. Fabricate sheet metal cladding in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 5. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal. Obtain field measurements for accurate fit before shop fabrication.
 - 6. Form sheet metal cladding to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 7. Conceal fasteners and expansion provisions where possible.
- B. Fabrication Tolerances:
 - 1. Fabricate sheet metal cladding that is capable of installation to a tolerance of 1/4-inch in 20-feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

- C. Sealant Joints: Where detailed and where movable, non-expansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal.
 - 1. Sizes shall be as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- E. Seams: Fabricate nonmoving seams with flat-lock seams.
 - 1. Copper: Tin edges to be seamed, form seams, and solder.
- F. Do not use graphite pencils to mark metal surfaces

2.5 GENERAL METAL FABRICATIONS

- A. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for fasteners. Use concealed fasteners where possible; use exposed fasteners to match existing work.
- B. Date Identification: Emboss on a concealed, interior surface of the metal body of each new component, in easily read characters, "MADE 2026." Manufacturer's name may also be embossed.

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 HISTORIC DECORATIVE METAL REPLICATION

- A. Replication Appearance Standard: Replicated surfaces are to have a uniform appearance as viewed from 10 ft. away by Architect.
- B. Execution of the Work: In replicating historic items, disturb remaining existing work as minimally as possible and as follows:
 - 1. Sequence work to minimize time before protective coatings are applied.
 - 2. Replace or reproduce historic items where indicated or scheduled.
 - 3. Make installation of replicated items reversible whenever possible.

3.2 INSTALLATION

- A. Install sheet metal cladding to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal cladding system.
 2. Install sheet metal cladding true to line, levels, and slopes.
 3. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant where required.
 4. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 5. Exposed edges shall be folded back to form hems.
 6. Install sheet metal cladding to fit substrates and to result in weathertight performance.
 7. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 8. Provide continuous cleats where indicated with fasteners spaced not more than 12-inches on center.
 9. Install individual cleats not more than 12-inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 10. Install sheet metal cladding with limited oil-canning, and free of buckling and tool marks.
 11. Do not field cut sheet metal cladding by torch.
 12. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of sheet metal flashing and trim with bituminous coating where cladding contacts wood, un-coated ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Form metal for thermal expansion of exposed cladding and concealed attachment components. Space movement joints at maximum of 10-feet with no joints allowed within 24-inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with sealant (concealed within joints).
1. Form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4-inches for nails and not less than 3/4 inch for wood screws. Coordinate with fabricator and installer to achieve maximum pull-out resistance. Do not damage face of adjacent construction.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for weathertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1-inch into sealant.
 - a. Form joints to completely conceal sealant.
 - b. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way.
 - c. Adjust setting proportionately for installation at higher ambient temperatures.
 - d. Do not install sealant-type joints at temperatures below 40 deg F.
 - e. Prepare joints and apply sealant in accordance with Division 07 Section "Joint Sealants."
2. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
 - a. Do not use torches for soldering.
 - b. Do not solder aluminum sheet.
 - c. Pre-tinning is not required for zinc-tin alloy-coated copper.
 - d. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 - e. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.
 - f. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 - g. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.

G. Provide uniform, neat seams with minimum exposure of welds, brazing, solder, and sealant.

H. Rivets: Rivet joints where necessary for strength.

3.3 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials and remove excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal cladding are installed unless otherwise indicated in manufacturer's written installation instructions.
- D. Upon completion of sheet metal cladding installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer.
- E. Maintain sheet metal cladding in clean condition during construction.
- F. Replace sheet metal cladding that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 050374

SECTION 050383 – HISTORIC CAST IRON REPAIR

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 historic treatment of cast iron in the form of repair as follows:
 - 1. Repairing cast iron.
 - 2. Re-anchoring cast iron to building structure.
- B. Related Requirements:
 - 1. Division 01 Section "Historic Treatment Procedures."
 - 2. Division 02 Section "Selective Demolition."
 - 3. Division 07 Section "Sheet Metal Fabrications and Flashing" for metal flashing installed in or on repaired stonework.
 - 4. Division 07 Section "Cold Fluid-Applied Waterproofing."
 - 5. Division 09 Section "Painting."
 - 6. Division 09 Section "High-Performance Coatings."

1.3 DEFINITIONS

- A. Very Low-Pressure Spray: Under 100 psi.
- B. Low-Pressure Spray: 100 to 400 psi
- C. Medium-Pressure Spray: 400 to 800 psi

1.4 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to historic cast iron repair including, but not limited to, the following:
 - a. Historic treatment specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.
 - c. Fire-protection plan.
 - d. Cast-iron historic treatment program.
 - e. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

A. Work Sequence: Perform cast-iron repair work in the following sequence:

1. Dismantle existing surface-mounted sheet metal and hardware that overlie cast-iron surfaces where applicable, except items indicated to remain in place. Tag items with location identification and protect.
2. Verify that temporary protections have been installed.
3. Examine condition of cast iron.
4. Clean cast-iron surface and remove paint and other finishes to the extent required.
5. Repair and replace existing cast iron and supports to the degree required for a uniform and sound surface on which to apply coatings or waterproofing and sheet metal cladding.
6. Cure repaired surfaces and allow them to dry for proper finishing.
7. Apply waterproofing, high-performance coating, or other finishes.
8. Install cladding and reinstall dismantled surface-mounted objects and hardware unless otherwise indicated.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include material descriptions and application instructions.
2. Include test data substantiating that products comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, and sections showing locations and extent of repair and replacement work, with enlarged details of replacement parts indicating materials, profiles, methods of attachment, accessory items, and finishes.
2. Include field-verified dimensions and the following:
 - a. Templates and directions for installing anchor bolts and other anchorages.
 - b. Identification of each required repair and its location on the structure in annotated plans and elevations.
 - c. Provisions for expansion, weep holes, and conduits as required for each location and exposure.
 - d. Provisions for sealant between cast-iron components and for sealant-type joints if required.

C. Samples for Initial Selection: For each type of cast-iron item and component with field-applied finishes.

1. Include samples of sealant materials, miscellaneous materials, and accessories involving size, color, or finish selection.

D. Samples for Verification: For the following materials, finished as required for use in the Work:

1. Each type of new material to be used for replacing existing or missing cast iron; 6 inches long in least dimension or whole item.

E. Fittings and Brackets:

1. Each type of exposed connection between components. Show method of finishing components at connections.
2. Each type of exposed finish; 6 inches long in least dimension.
3. Sealant materials.

F. Accessories: Each type of anchor, accessory, and miscellaneous support in required finishes.

1.7 INFORMATIONAL SUBMITTALS

A. Contractor Qualifications Data: Submit documentation of the qualifications of the Contractor and any Sub-Contractor(s) to the Contractor, as specified in the Article, "Quality Assurance."

1. Qualifications Data shall be prepared by the Contractor or Sub-Contractor proposing to perform the specified Work.
2. Qualification Data for persons who will be completing the Work to demonstrate their capabilities and experience. Include a list of completed projects with names of persons involved.

B. Qualification Data: For historic treatment specialist.

C. Cast-Iron Historic Treatment Program: For repairing historic cast iron.

1.8 MAINTENANCE MATERIALS SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents, including material, finish, source, and location on or in building.

1.9 QUALITY ASSURANCE

A. Historic Treatment Specialist Qualifications: A qualified historic cast-iron repair specialist. Experience in repairing, brazing, and welding wrought iron, steel, or cuprous metals and installing and finishing new cast-iron work is insufficient experience for historic cast-iron repair work.

1. The Contractor or specialist sub-contractor to the Contractor shall have not less than ten (10) years successful experience in historic cast-iron repair; shall employ on this project personnel skilled in the restoration processes and operations indicated
2. The Contractor or specialist sub-contractor to the Contractor shall have successfully completed not less than three (3) projects in the last five (5) years of a similar scope and general requirements of this project.
3. These projects shall be identified on the bid form, including project information, contacts, and photos of completed work. The projects shall be similar in scope and general requirements to this project, at similar historic properties, and involving coordination with other restoration specialties.
 - a. Similar scope shall be defined in general as having similar major components of this project, including cast-iron repair.
 - b. Representative projects shall be of a similar size and complexity as this project.
 - c. The work on the submitted projects shall have been completed in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties.

- d. At least one (1) of the projects shall have been reviewed by a State Historic Preservation Office within the last five (5) years, or have been subject to historic preservation compliance review by a local or county review board.
 - e. Representative projects listed as evidence of a Contractor's qualifications shall have been managed and/or executed by personnel employed by the firm submitting evidence of qualifications.
 4. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that historic cast-iron repair is in progress. Supervisors shall not be changed during Project except for causes beyond control of restoration specialist firm.
 5. The company proposing to perform Work requiring qualifications as specified in this Section shall be considered as a firm part of the bid.
 - a. Substitution after the Award of Contract can only be made subject to the Architect's and Owner's review and approval of new Qualifications Data by the proposed substitute company. Substitutions for key persons identified on the Qualifications Data will be subject to review and approval at the discretion of the Architect and Owner.
 6. As part of the evaluation of qualifications, the Architect and/or Owner may determine that the Contractor or Subcontractor has established on previous project(s) (whether federal, state, municipal, or commercial), a record of unsatisfactory work or a repeated failure to complete contracts awarded to them within the contract time, or that the Contractor or Sub-Contractor has failed to meet the specified qualification requirements, which may be the basis for rejection of the Contractor or Sub-Contractor.
 7. Failure on the part of a Contractor to provide complete Qualifications Data required herein within the required time may result in the Contractor being found non-responsive and may be grounds for rejection of its bid.
- B. Historic Brazing-and-Welding Specialist: A qualified brazing-and-welding-repair specialist experienced with these repairs on historic cast iron. Have the brazing-and-welding specialist work under direction of the historic treatment specialist.
 1. Refer to requirements in Paragraph A of this section.
- C. Historic Metal-Stitching Specialist: A qualified metal-stitching-repair specialist experienced with metal stitching of historic cast iron. Have the metal-stitching specialist work under direction of the historic treatment specialist.
 1. Refer to requirements in Paragraph A of this section.
- D. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing.
- E. Cast-Iron Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for historic cast-iron repair work, including each process or phase of repairing cast iron, related work, and the protection of surrounding materials and Project site.
 1. If materials and methods other than those indicated are proposed for any phase of historic treatment work, add a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project.

- F. Mockups: Prepare mockups of historic treatment repair processes on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.
1. Repairing Metal Component: The Contractor shall be required to complete two cast-iron pinning and metal-stitching repairs on sample pieces of cast iron.
 2. Cleaning Metal Component: The Contractor shall be required to complete a cleaning and preparation sample at an area minimum 4'-0" x 4'-0" and shall demonstrate the Contractor's understanding of the level of cleaning and preparation required of the cast-iron.
 3. Samples shall be redone as many times as necessary to the satisfaction of the Architect and Owner at no additional cost to the Owner.
 4. Final mock-up locations to be coordinated in the field with Owner and Architect.
 5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with historic cast-iron repair only when existing and forecasted weather conditions are within the environmental limits set by each manufacturer's written instructions and specified requirements.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. Provide metal materials made of the alloys, forms, and types that match existing metals and that have the ability to receive finishes.
- B. Source Limitation for Cast Materials:
1. Obtain cast materials for cast-iron repair from single source from single manufacturer with resources to provide materials of consistent quality in appearance and physical properties
- C. Cast Iron:
1. Gray-Iron Castings: ASTM A48/A48M, Class 30.
 2. Malleable-Iron Castings: ASTM A47/A47M, grade as recommended in writing by fabricator for type of use indicated.

2.2 PREPARATORY CLEANING MATERIALS

- A. Water: Potable
- B. Hot Water: Water heated to a temperature of 140 to 160 deg F.

- C. Detergent Solution, Job Mixed: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium pyrophosphate (TSP), 1/2 cup (125 mL) of laundry detergent, and 20 quarts (20 L) of hot water for every 5 gal. (20 L) of solution required.
- D. Abrasive Materials:
 - 1. Abrasive Pads: Non-scratch, of the following type(s):
 - a. Abrasive Pad with Sponge: Combination plastic abrasive pad, consisting of a sponge enclosed with a woven urethane, polypropylene, or other plastic mesh or fabric, without other abrasive components that can scratch metal.
 - b. Abrasive Pad of Plant Fibers: Agave, loofa, or another tough plant fiber, without other abrasive components that can scratch metal.
 - 2. Medium Abrasives for Ferrous Metals: Aluminum-oxide paper, emery paper, fine steel wool, steel scrapers, and steel-wire brushes of various sizes.
 - 3. Medium Abrasives for Copper-Alloys: Extra-fine bronze wool or plastic abrasive pads.
- E. Wash Cloths: Lint-free, absorbent, durable cloth without abrasives that can scratch metal.
- F. Rust Remover: Manufacturer's standard phosphoric acid-based gel formulation, also called "naval jelly," for removing corrosion from iron and steel.

2.3 PINNING MATERIALS

- A. Pins: Threaded, stainless-steel rod, cut to length as required for each repair.
- B. Pinning Adhesive: Epoxy adhesive recommended in writing by adhesive manufacturer for bonding to cast iron.

2.4 METAL STITCHING MATERIALS

- A. Stitching Pins: Threaded steel screws sized for the thickness and condition of cast iron being repaired, with thread design that pulls the sides of a crack together, thereby both sealing the crack and adding strength to the repair.
- B. Locks: Multiple-dumbbell-shaped ties cut from steel sheet for installation in multiple thicknesses to add strength and distribute stresses in the cast iron as required for the thickness and condition of cast iron being repaired.

2.5 FASTENERS

- A. Fasteners: Fasteners of the same basic metal as fastened metal unless otherwise indicated. Use metals that are noncorrosive and compatible with each metal joined.
 - 1. Match existing fasteners in material and in type of fastener unless otherwise indicated.
 - 2. Use concealed fasteners for interconnecting cast-iron components and for attaching them to other work unless exposed fasteners are unavoidable or the existing fastening method.

3. For exposed fasteners, use slotted machine screws of head profile flush with metal surface unless otherwise indicated or another head is required to match the existing fastening method as determined by Architect.
4. Finish heads of exposed fasteners to match finish of metal fastened unless otherwise indicated.

2.6 ACCESSORIES

A. Metal-Patching Compound:

1. Two-part, epoxy- or polyester-resin, metal-patching compound; knife-grade formulation as recommended in writing by manufacturer for type of metal repair indicated, tooling time required for the detail of work, and site conditions. Compound shall be produced for filling cast iron that has deteriorated because of corrosion or deformation. Filler shall be capable of filling deep holes and spreading to feather edge.

B. Brazing Rods for Cast Iron: Type and alloy as recommended in writing by brazing-rod manufacturer and as required for strength and compatibility with cast-iron items.

C. Welding Electrodes and Filler Metal: Select according to AWS specifications for welding cast-iron; use compatible metal type and alloy as required for strength, and compatibility with cast-iron items.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended in writing by manufacturer for interior and exterior applications.

E. Sealant Materials:

1. Provide manufacturer's standard, elastomeric **nonstaining, single-component, nonsag silicone** sealant complying with applicable requirements in Section 079200 "Joint Sealants."
2. Colors: Provide colors of exposed sealants to match colors of metals in which sealant is placed unless otherwise indicated.

F. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer compatible with waterproofing or high-performance coating indicated. Refer to waterproofing or coating manufacturer's requirements.

G. Surface Preparation: Refer to Division 07 Sections "Cold Fluid-Applied Waterproofing" and "High-Performance Coatings."

H. VOC Limit: Use coatings with a VOC content of 400 g/L (3.3 lb/gal.)

I. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

J. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, glazed masonry, and polished stone surfaces from damaging effects of acidic and alkaline cleaners.

K. Masking Tape: Nonstaining, nonabsorbent material; compatible with chemical solutions being used and substrate surfaces, and that will easily come off entirely, including adhesive.

- L. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:
 - 1. Previous effectiveness in performing the work involved.
 - 2. Little possibility of damaging exposed surfaces.
 - 3. Consistency of each application.
 - 4. Uniformity of the resulting overall appearance.
 - 5. Do not use products or tools that could do the following:
 - a. Remove, alter, or in any way harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in the Contract.
 - b. Leave an unintended residue on surfaces.

2.7 FINISHES, GENERAL

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 FERROUS METAL FINISHES

- A. Repair Primer: Manufacturer's standard, rust-inhibiting, fast-curing, lead- and chromate-free universal primer, compatible with applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
- B. Finish Primer: Primer complying with applicable requirements in Section 099600 "High Performance Coatings" for finish painting of primed metal.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
 - 1. Cover adjacent surfaces with materials that are proved to resist chemical solutions being used unless products being used will not damage adjacent surfaces. Use protective materials that are waterproof and UV resistant. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 - 2. Do not apply chemical solutions during winds of enough force to spread them to unprotected surfaces.
 - 3. Neutralize alkaline and acid wastes before disposal.

4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
- B. All materials and application equipment shall be subject to measures to prevent environmental pollution and to maintain public safety while in use, in compliance with OSHA, and the referenced specifications.

3.2 HISTORIC CAST IRON REPAIR, GENERAL

- A. Repair Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.
- B. Execution of the Work: In repairing historic items, disturb remaining existing work as minimally as possible and as follows:
 1. Stabilize cast iron to reestablish structural integrity and weather resistance while maintaining the existing form of each item.
 2. Remove deteriorated coatings and corrosion.
 3. Sequence work to minimize time before protective coatings are reapplied.
 4. Repair items where stabilization is insufficient to stop progress of deterioration.
 5. Repair items in place unless otherwise indicated and retain as much original material as possible.
 6. Replace or reproduce historic items where indicated or scheduled.
 7. Make historic treatment of materials reversible whenever possible.
 8. Install temporary protective measures to stabilize cast iron that is indicated to be repaired later.
- C. Mechanical Coating Removal: Use gentlest mechanical methods, such as scraping and wire brushing, that do not abrade metal substrate. Do not use abrasive methods, such as sanding, or power tools except as indicated as part of the historic treatment program and approved by Architect.
- D. Repairing Cast-Iron Items: Match existing features, retaining as much original material as possible to complete the repair.
 1. Unless otherwise indicated, repair cast iron by patching, filling, piecing-in, splicing, or otherwise reinforcing the existing cast iron with new material matching existing.
 2. Where indicated, repair cast iron by limited replacement to the extent indicated, matching existing material.
- E. Replacing Cast-Iron Components: Where indicated, duplicate and replace items with new material matching existing.
 1. Replace heavily deteriorated or missing parts or features of cast iron with compatible materials, using surviving prototypes to create patterns or molds for duplicate replacements.
 2. Do not use substitute materials unless otherwise indicated.

3.3 PREPARATORY CLEANING

- A. Perform preparatory cleaning before performing repair work.
 - 1. Brushes: If using wire brushes, use steel or stainless-steel brushes that are resistant to chemicals being used.
 - 2. Spray Equipment: Use only as approved by Owner and Architect. Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that spray methods do not damage surfaces.
 - a. Equip units with pressure gages.
 - b. For water-spray application, use fan-shaped spray that disperses water at an angle of 25 to 50 degrees
 - c. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.
 - 3. Uniformity: Perform each cleaning method in a manner that results in uniform coverage of all surfaces, including corners, contours, and interstices, and that produces an even effect without streaks or damaging surfaces.
 - 4. Protection: After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.
- B. Water Cleaning:
 - 1. Clean with water applied with sponges or wash cloths or low-pressure spray to remove detergent solution, soil, and loose paint.
- C. Detergent Cleaning:
 - 1. Wet surface with water applied with sponges or wash cloths or low-pressure spray.
 - 2. Scrub surface with detergent solution and natural-fiber bristle brush until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that surface remains wet.
 - 3. Clean with water as described above.
- D. Cleaning by Abrasive Blasting: Refer to Division 07 Section "Cold-Fluid Applied Waterproofing" and Division 09 Section "High-Performance Coatings"
 - 1. Remove adhered paint and surface corrosion by dry blasting with specified blasting abrasive at pressure and distance from surface indicated below.
 - a. Pressure and Distance from Surface: As established by mockup
 - 2. Do not rinse cast iron with water; wipe with soft brushes and damp cloths to remove residue.
 - 3. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
 - 4. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.
- E. Cleaning by Mechanical Removal:
 - 1. Remove adhered paint and surface corrosion with approved, medium abrasives for ferrous metals.

2. Wipe off residue with mineral spirits and either steel wool or soft rags.
3. Dry immediately with clean, soft cloths. Follow direction of grain in metal.
4. Prime immediately to prevent rust. Do not touch cleaned metal surface until primed.

3.4 DISMANTLING, REPAIR, AND INSTALLATION

- A. Repair cast iron in place insofar as practicable unless otherwise indicated. Where necessary, dismantle components from their substrate and repair and reinstall according to approved historic treatment program.
- B. Perform dismantling work as required in Section 024296 "Historic Removal and Dismantling."
- C. Installation:
 1. Locate and place cast-iron items level and plumb and in alignment with adjacent construction.
 - a. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
 2. Use concealed anchorages where possible unless otherwise indicated.
 3. Form tight joints with exposed connections accurately fitted together.
 4. Install concealed joint fillers, sealants, and flashings, as the Work progresses, to make exterior items weatherproof.
 5. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.
 6. Touch Up: At completion of installation, touch up and restore damaged or defaced finish surfaces and fastener heads.
- D. Sealant: Clean and prepare joint surfaces and apply and cure sealant according to Section 079200 "Joint Sealants."
 1. Keep joint surfaces to receive sealant dry and free of debris.
 2. Apply sealant on joint surfaces between abutting cast-iron components in a continuous application immediately before joining the components together. Remove excess after components are joined and tightened.
 3. Fill sealant-type joints with specified joint sealant as recommended in writing by sealant manufacturer and the following:
 - a. Install sealant using only proved installation methods that ensure sealant is deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding metal.
 - b. Do not allow sealant to overflow or spill onto adjoining surfaces or to migrate into the voids of adjoining surfaces, particularly rough or sculptural textures. Promptly remove excess and spillage of sealant as the work progresses. Clean adjoining surfaces by means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.

3.5 PINNING

- A. Use cast-iron piece that has broken-off or a custom, cast replica of a similar item. Verify that repair piece is a correct match for remaining existing work and of a size that can be pinned.
- B. Grind mating surfaces of base metal and repair piece along the repair seam to produce an accurate fit and alignment with the base assembly. Grind mating surfaces to produce joint size no larger than 1/32 inch.
- C. Exposed Pinning: Before applying adhesive, prepare for mechanical anchorage consisting of 1/8-inch-diameter, threaded stainless-steel pins set into 3/16-inch-diameter holes drilled at through face of repair piece and into base metal. Insert pins at least 1 inch into base metal and 1 inch into repair piece with end countersunk at least 1/4 inch from exposed face of repair piece. For large pieces, center and space pins 3 inches apart and at least 1/4 inch from any edge.
- D. Concealed Pinning: Before applying adhesive, prepare for concealed mechanical anchorage consisting of 1/8-inch-diameter, threaded stainless-steel pins set into aligned, 3/16-inch-holes drilled into base metal and into, but not through, the repair piece. Insert pins at least 1 inch into base metal and 1 inch into repair piece. For large pieces, center and space pins 3 inches apart and at least 1/4 inch from any edge.
- E. Apply pinning adhesive according to adhesive manufacturer's written instructions. Fill holes and coat bonding surfaces of base metal and repair piece.
- F. Apply repair piece while adhesive is fresh and hold securely in place until adhesive has cured. Use temporary shims, clamps, wedges, or other devices as necessary to keep repair piece and base metal aligned.

3.6 METAL STITCHING

- A. Install metal stitching materials according to written instructions of metal-stitching-system manufacturer for the thickness and condition of cast iron being repaired.
- B. Drill, tap, and install metal stitching pins along entire length of crack being repaired, overlapping the pins to ensure complete sealing and pulling together of sides of the crack.
- C. Cut slots shaped and sized to hold locks. Do not cut slots deeper than 90 percent of the thickness of the cast iron.
- D. Install locks with three large lobes and spaced as recommended in writing by metal-stitching-system manufacturer for each lock location. Install locks in three layers unless otherwise recommended in writing by metal-stitching-system manufacturer.
- E. Grind off metal-stitching materials that project above surface of cast iron without damaging cast-iron surface.

3.7 PRIMING

- A. Repair Primer: Apply immediately after completing a repair.
- B. Finish Primer: Apply as soon after cleaning as possible.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
- B. Notify testing agency in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors have had reasonable opportunity to inspect work areas at locations of lift devices or scaffolding.

END OF SECTION 050383

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes the following:
 - 1. For new flagpole access ladder:
 - a. Metal ladders.
 - b. Metal ships' ladders.
 - c. Pipe and tube railings and guards.
 - 2. Miscellaneous metal fabrications not specified in other Sections.
- B. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for wood framing, anchors, and wood connectors.

1.3 DEFINITIONS

- A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas and for pedestrian guidance and support, visual separation, or wall protection.

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Schedule installation so attachments are made only to completed construction. Do not support metal fabrications temporarily by any means that do not satisfy structural performance requirements.

1.5 PRE-INSTALLATION MEETINGS

- A. Pre-Installation Conference: Conduct conference at Project site.

1.6 SUBMITTALS

- A. Product Data: For the following items:

1. Fasteners.
 - B. Sustainable Product Documentation:
 1. For products having recycled content, documentation indicating postconsumer and pre-consumer recycled content and cost.
 - C. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 1. Ladders, Ships' Ladders, Stairs, Railings, and Guards:
 - a. Include plans, elevations, sections, details, and attachments to other work.
 - b. Indicate sizes of metal sections, metal thickness, profiles, holes, and field joints.
 - c. Include plan at each level.
 - d. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.
 - e. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters, including finish.
 - f. Fittings and brackets.
 - g. Show method of connecting and finishing members at intersections.
 - D. Samples for Initial Selection: For products involving selection of color, texture, or design.
 - E. Samples for Verification: For the following items:
 1. Each type and finish of railing system, railing brackets, and fittings.
 - F. Delegated-Design Submittal: For ladders, ship's ladders, stairs, guards, and railings including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 1. Comply with the requirements for Delegated Design set forth in Division 01 Section "Quality Requirements".
 - G. Qualification Data: For testing agency and for professional engineer.
 - H. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.
 - I. Welding certificates: Copies of certificates for welding procedures and personnel.
 - J. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
 - K. Evaluation Reports: For post-installed anchors, from ICC-ES.
- 1.7 QUALITY ASSURANCE
- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 3. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
 4. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Store materials to permit easy access for inspection and identification.
 - 1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
 - 2. Protect steel members and packaged materials from corrosion and deterioration.
 - 3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.
 - a. Repair or replace damaged materials or structures as directed.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.
- B. Temporary Support Facilities: Furnish, install, and remove when no longer required, all temporary lifts, hoists, staging, scaffolding, rigging, labor and materials, and temporary support to perform all operations in connection with the installation of this Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design ladders, ship's ladders, stairs, guards, and railings.
- B. Structural Performance of Ladders, Ship's Ladders, and Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load: 100 lbf/sq. ft.
 - 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to L/360 or 1/8-inch, whichever is less.
 - 6. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and as indicated on the Structural Drawings.
- C. Structural Performance of Railings and Guards: Railings and guards, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
3. In engineering railings and guards to withstand structural loads indicated above, determine allowable design working stresses of railing materials based on the following:
 - a. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
 - b. Copper Alloys: 60 percent of minimum yield strength.
 - c. Stainless Steel: 60 percent of minimum yield strength.
 - d. Steel: 72 percent of minimum yield strength.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names or blemishes.
- B. Aluminum: 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.
 1. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.
 2. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
 3. Aluminum Extruded Bars and Shapes, Including Extruded Tubing: ASTM B221/B221M, Alloy 6063-T5/T52.
 4. Aluminum Extruded Structural Pipe and Round Tubing: ASTM B429/B429M, Alloy 6063-T6. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.
 5. Drawn Seamless Tubing: ASTM B210/B210M, Alloy 6063-T832.
 6. Aluminum Die and Hand Forgings: ASTM B247/B247M, Alloy 6061-T6.
 7. Aluminum Castings: ASTM B26/B26M, Alloy A443.0-F.
- C. Stainless Steel: Provide Type 316L at exterior locations and Type 304 at interior locations.
 1. Stainless-Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666.
 2. Stainless-Steel Bars and Shapes: ASTM A276.
 3. Stainless Steel Tubing: ASTM A554, Grade MT.
 4. Stainless Steel Pipe: ASTM A312/A312M, Grade TP.
 5. Stainless Steel Castings: ASTM A743/A743M, Grade CF 8 or CF 20.
 6. Stainless Steel Rolled Floor Plate: ASTM A793.
- D. Steel and Iron: Provide products that have a postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 1. Steel Plates, Shapes and Bars: ASTM A36/A36M.
 2. Steel Bars: Hot-rolled, carbon steel complying with ASTM A29/A29M, Grade 1010

3. Rolled-Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.
4. Uncoated, Cold-Rolled Steel Sheet: ASTM A1008/A1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.
5. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.
6. Galvanized Steel Sheet: ASTM A653/A653M, G90 coating, either commercial steel, Type B, or structural steel, Grade 33, unless another grade is required by design loads.
7. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
8. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - a. Provide galvanized finish for exterior installations and where indicated.
9. Slotted Channel Framing: Cold-formed metal box channels complying with MFMA-4.
 - a. Size of Channels: 1-5/8 by 1-5/8-inches, unless otherwise indicated.
 - 1) Material: Cold-rolled steel, ASTM A1008/A1008M, commercial steel, Type B; 0.0677-inch minimum thickness; with G90 hot-dip galvanized after fabrication.

2.3 FASTENERS

- A. General: Select fasteners for type, grade, and class required.
 1. Interior Aluminum and Stainless Steel: Type 304 stainless steel.
 2. Bronze Items: Bronze.
 3. Dissimilar Metals: Type 304 stainless-steel; except Type 316 at exterior.
 4. Exterior: Type 316 stainless-steel.
 5. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed.
 6. Exterior Walls and Basements: Galvanized-Steel Components: Zinc-plated-steel fasteners complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 25 for electrodeposited zinc coating.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.
- D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; 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. Anchors, General: 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 in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
 1. Machine Screws: ASME B18.6.3.
 2. Lag Screws: ASME B18.2.1.
 3. Wood Screws: Flat head, ASME B18.6.1.
 4. Plain Washers: Round, ASME B18.22.1.
 5. Lock Washers: Helical, spring type, ASME B18.21.1.

- F. Post-Installed Anchors: Torque-controlled expansion anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.
- G. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3-inches long at not more than 8-inches on center. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- E. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - 1. For aluminum and stainless-steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- F. Brazing Rods: For copper-alloy railings, provide type and alloy as recommended by producer of metal to be brazed and as required for color match, strength, and compatibility in fabricated items.
- G. Lacquer for Copper Alloys: Clear acrylic lacquer specially developed for coating copper-alloy products.
- H. Etching Cleaner for Galvanized Metal: Complying with MPI #25.
- I. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, non-staining, noncorrosive, nongaseous, non-shrink grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- J. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight concrete with a minimum 28-day compressive strength of 3,000 psi.
- K. Welded Wire Reinforcement: ASTM A185/A185M, 2 by 2-inches by 0.062-inch diameter steel wire, complying with ASTM A1064/A 1064M, except for minimum wire size.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Fabricate ladders, ship's ladders, stairs, guards, and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
 - 1. Provide complete assemblies, including metal framing, hangers, struts, railings and guards, clips, brackets, bearing plates, and other components necessary to support and anchor ladders, ship's ladders, stairs, and platforms on supporting structure.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32-inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld corners and seams continuously to comply with the following:
 - 1. Weld all joints unless otherwise indicated.
 - 2. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld continuously all around at connections, including at fittings.
 - 3. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 4. Obtain fusion without undercut or overlap.
 - 5. Remove welding flux immediately.
 - 6. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 - Completely sanded joint with some undercutting and pinholes okay. (Contour of welded surface matches that of adjacent surface.)
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- H. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- I. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- J. 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.
- K. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8-inches from ends and corners of units and 24-inches on center, unless otherwise indicated.

2.6 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. Galvanize miscellaneous framing and supports used in exterior applications, in exterior walls, where in contact with masonry and concrete, and where indicated.

2.7 METAL LADDERS

- A. Comply with ANSI A14.3.
- B. Steel Ladders:
 - 1. Space side rails 18-inches apart, unless otherwise indicated.
 - 2. Side Rails: Continuous, as detailed on Architectural Drawings.
 - a. Interior Ladders: 3/8-by-2-1/2-inch steel flat bars with eased edges.
 - b. Exterior Ladders: 1 1/2-inch nominal (1.990-inch diameter) Schedule 40 steel pipe.
 - 3. Rungs: 3/4-inch-diameter solid steel bars.
 - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
 - 5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
 - 6. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2-inch in least dimension.
 - 7. Support each ladder at top and bottom and not more than 60-inches on center with welded or bolted steel brackets.
 - 8. Galvanize all ladders, including brackets.

2.8 METAL SHIPS' LADDERS

- A. Provide steel ships' ladders where indicated. Fabricate of open-type construction with channel stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.
 - 1. Treads shall be not less than 5-inches exclusive of nosing or less than 8-1/2 inches including the nosing, and riser height shall be not more than 9-1/2 inches.
 - 2. Fabricate ships' ladders, including railings from steel.
 - 3. Fabricate treads and platforms from rolled diamond steel floor plate.
 - 4. Comply with applicable railing requirements in Paragraph 2.1.
- B. Prime and field paint interior ships' ladders; including treads, railings, brackets, and fasteners. Hot dip galvanized exterior ship's ladders.

2.9 METAL RAILINGS AND GUARDS

- A. Fabricate railings and guards to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of member, post spacings, wall bracket spacing, and anchorage, but not less than that needed to withstand indicated loads.
 - 1. Rails and Posts: Size and shape as indicated on Drawings.
 - 2. Baluster/Picket Infill: Size and shape as indicated on Drawings. Spaced to prohibit the passage of a 4-inch diameter sphere.
 - 3. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with spring hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.
- B. Shop assemble railings to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Welded Connections: Fabricate railings and guards with welded connections.
 - 1. Fabricate connections that are exposed to weather in a manner that excludes water.
 - a. Provide weep holes where water may accumulate internally.
 - 2. Cope components at connections to provide close fit, or use fittings designed for this purpose.
 - 3. Weld all around at connections, including at fittings.
 - 4. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 5. Obtain fusion without undercut or overlap.
 - 6. Remove flux immediately.
 - 7. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 - Completely sanded joint, some undercutting and pinholes are okay as shown in NAAMM AMP 521.
- D. Brazed Connections: Connect copper-alloy railings by brazing. Cope components at connections to provide close fit, or use fittings designed for this purpose. Braze corners and seams continuously.
 - 1. Use materials and methods that match color of base metal, minimize distortion, and develop maximum strength and corrosion resistance.
 - 2. Remove flux immediately.
 - 3. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and brazed surface matches contours of adjoining surfaces.
- E. Form changes in direction of railings and guards as follows:
 - 1. As detailed.
 - 2. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.
- F. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

- G. 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.
- H. Close exposed ends of railing and guard members with prefabricated end fittings.
- I. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
 - 1. Close ends of returns unless clearance between end of rail and wall is 1/4-inch or less.
- J. Connect posts to stair framing by direct welding unless otherwise indicated.
- K. For railing posts set in concrete, provide galvanized steel sleeves not less than 6-inches long with inside dimensions not less than 1/2-inch greater than outside dimensions of post, with steel plate forming bottom closure.
- L. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports.
 - 1. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.
- M. Pipe and Tube Railing Flanges and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
- N. For removable railing posts, fabricate slip-fit sockets from galvanized steel tube or pipe whose inside diameter is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.
 - 1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
- O. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.
- P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.10 MISCELLANEOUS STEEL TRIM AND CLOSURES

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.
- D. Prime and paint in field where indicated in Division 09 Section "Painting".

2.11 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.12 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Finish metal fabrications after assembly.
- D. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.
- E. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- F. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.
- G. For non-galvanized steel railings, provide non-galvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
- H. Galvanizing: Hot dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 - 1. Comply also with the following standards:
 - a. ASTM A384 for Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
 - b. ASTM A385 for Standard Practice for Providing High Quality Zinc Coatings.
 - c. ASTM A386 for Galvanizing Assembled Steel Products.
 - 2. Fill vent and drain holes that will be exposed in the finished Work after galvanizing, unless indicated to remain as weep holes, by plugging with zinc solder, filing off and grinding smooth.
 - 3. Do not quench or apply post galvanizing treatments that might interfere with paint and/or primer adhesion.
- I. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- J. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated. Shop prime with universal shop primer.

- K. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
 - 5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."
- L. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Shop prime uncoated railings with universal shop primer unless otherwise indicated.
 - 3. Do not apply primer to galvanized surfaces.
- M. Stainless Steel Finishes:
 - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches. Run grain of directional finishes with long dimension of each piece.
 - 3. Directional Satin Finish: No. 4.
 - 4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- N. Copper Alloy Finish: Finish designations for copper alloys comply with the system for designating copper-alloy finish systems defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."
 - 1. Hand-Rubbed Finish, Lacquered: M31-M34-O6x (Mechanical Finish: directionally textured, fine satin; Mechanical Finish: directionally textured, hand rubbed; Coating: clear organic, air dried, lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of 1 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.
 - 1. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Examine substrates for wall mounted railings, to verify that locations of inserts and concealed reinforcements have been clearly marked for Installer. Locate inserts and reinforcements, and mark locations if not already done.

3.2 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; 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.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.3 INSTALLATION OF POSTS, RAILINGS, AND GUARDS

- A. Corrosion Protection: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials. Coat concealed surfaces of aluminum and copper-alloys that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with heavy coat of bituminous paint.
- B. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.
- C. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.
- D. Non-Welded Connections: Use at sections where removable railings are indicated. Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

- E. Expansion Joints: Install at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2-inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6-inches of post.
- F. Posts: Unless otherwise indicated, weld all posts associated with metal stairs and railings.
 - 1. At Concrete Construction: Use metal sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, non-metallic grout, or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
 - a. Form or core-drill holes not less than 5-inches deep and 3/4-inch larger than outside diameter of post for installing posts in concrete. Clean holes of all loose material, insert posts, and fill annular space between post and concrete with non-shrink, non-metallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
 - 2. At Wood Construction: Anchor posts with angle type and/or round floor type flanges as detailed and required by conditions, connected to posts and to metal supporting members by welding flanges to post and bolt to metal supporting surfaces.
 - a. Cover anchorage joint with escutcheon flange of same metal as post, attached with set screws.
 - 3. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.
- G. Adjust railing and guard systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.
 - 1. Space posts at spacing indicated or, if not indicated, as required by design loads.
 - 2. Plumb posts in each direction, within a tolerance of 1/16-inch in 3 feet.
 - 3. Align rails and guards so variations from level for horizontal members and variations from parallel with rake of stairs for sloping members do not exceed 1/4-inch in 12 feet.
 - 4. Secure posts, rail ends, and guard ends to building construction as follows:
 - a. Anchor posts to steel by welding to steel supporting members.
- H. Install railing gates level, plumb, and secure for full opening without interference.
 - 1. Attach hardware using tamper-resistant or concealed means.
 - 2. Adjust hardware for smooth operation.
- I. Attaching Railings: Provide brackets with minimum clearance as indicated from inside face of handrail to adjacent finished surfaces. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
 - 1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads but not greater than 60-inches on center.
 - 2. Attach railings to posts with custom brackets.
 - 3. Attach railings to walls with wall mounted handrail brackets.
 - 4. Secure brackets to adjacent construction as follows:
 - a. For concrete and masonry, use drilled-in expansion shields and hanger or lag bolts.
 - b. For hollow masonry anchorage, use toggle bolts.
 - c. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
 - d. For wood posts, use hanger or lag bolts set into posts.

- e. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.

3.4 INSTALLATION OF 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. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 - 1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installation of Bearing and Leveling Plates" Article. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.5 INSTALLATION OF METAL SHIPS' LADDERS

- A. Secure top and bottom of ships' ladders to construction to comply with manufacturer's written instructions.

3.6 INSTALLATION OF MISCELLANEOUS STEEL TRIM

- A. Anchor to concrete construction to comply with manufacturer's written instructions.

3.7 ADJUSTING, CLEANING, REPAIRS, AND PROTECTION

- A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.
- B. Clean copper alloys according to metal finisher's written instructions in a manner that leaves an undamaged and uniform finish matching approved Sample.
- C. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- D. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.
- E. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
 - b. Refer to Division 09 Section "Painting" for surfaces field painted.

- F. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wood blocking, cants, nailers, and other accessories used as required for roofing installation.
 - 2. Plywood roofing sheathing.
 - 3. Plywood parapet framing.
- B. Related Requirements:
 - 1. Division 07 Section "Preparation for Reroofing".
 - 2. Division 07 Section "Slate Shingle Roofing".
 - 3. Division 07 Section "PVC Roofing".

1.3 DEFINITIONS

- A. Boards: Lumber of less than 2-inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2-inches nominal size or greater but less than 5-inches nominal size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. OSB: Oriented strand board.
- E. LSL: Laminated strand lumber.
- F. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. SPIB: The Southern Pine Inspection Bureau.
 - 4. WCLIB: West Coast Lumber Inspection Bureau.
 - 5. WWPAA: Western Wood Products Association. (RIS: Redwood Inspection Service)
- G. LVL: Laminated veneer lumber.
- H. PSL: Parallel strand lumber.
- I. Rough Carpentry: Carpentry work not specified in other sections and not exposed, unless otherwise indicated.
- J. Timber: Lumber of 5-inches nominal size or greater in least dimension.

1.4 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-preserved treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - a. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 4. Include copies of warranties from chemical treatment manufacturers for each type of treatment. (i.e., wood-preserved, and fire-retardant)
 5. Additional information:
 - a. For adhesives, documentation including printed statement of VOC content.
 - b. For composite wood products, documentation indicating that product contains no urea formaldehyde.
 - c. Laboratory Test Reports: For composite wood products and adhesives, indicating compliance with requirements for low-emitting materials.
 6. Fasteners, anchors, and metal framing anchors.
- B. Material Certificates:
1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
 2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.
- C. Manufacturer Instructions: Provide manufacturer's written installation instructions.
- D. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preserved-treated wood and plywood.
 2. Fire-retardant-treated wood and plywood.
 3. Engineered wood products.
 4. Power-driven fasteners, powder-actuated fasteners, and post-installed anchors.
 5. Metal framing anchors.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- B. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source and from a single manufacturer.

- C. Source Limitations for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source and from a single producer.

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For items exposed to view in the completed Work or items indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
 - 4. Provide dressed lumber, S4S, unless otherwise indicated.
 - 5. Maximum Moisture Content of Wood: 19 percent for 2-inch nominal thickness or less, unless otherwise indicated.
- B. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 DIMENSION LUMBER FRAMING

- A. General: Provide dimension lumber of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.
- B. Maximum Moisture Content: 19 percent.
- C. Non-Load-Bearing Interior Partitions: Construction or No. 2; any of the following species:

1. Mixed southern pine; SPIB.
2. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWP.
3. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWP.

D. Load Bearing Framing: No. 2 grade and any of the following species:

1. Douglas fir-larch; WCLIB or WWP.
2. Douglas fir-larch (north); NLGA.
3. Hem-fir; WCLIB or WWP.
4. Southern pine; SPIB.
5. Spruce-pine-fir; NLGA.

E. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade and any of the following species:

1. Hem-fir (north); NLGA.
2. Southern pine; SPIB.
3. Douglas fir-larch; WCLIB or WWP.
4. Mixed southern pine; SPIB.

F. Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

1. Species and Grade: As indicated above for load-bearing construction of same type.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including blocking, nailers, rooftop equipment bases, support curbs, cants, furring and grounds.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.
- C. Concealed Blocking and Nailers: Select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD SHEATHING

- A. General: Plywood: DOC PS 1.
1. Thickness: As needed to comply with requirements specified, but not less than thickness indicated. All plywood to have a minimum of 5 plies.
 2. Factory mark panels to indicate compliance with applicable standard.
 3. Manufacture in accordance with American Plywood Association standards.

- B. Plywood Blocking and Sheathing: Where plywood is shown for blocking and/or sheathing applications, provide DOC PS1, Exterior, CDX plywood.
 - 1. Span Rating: Not less than 16/0.
 - 2. Nominal Thickness: As indicated on Drawings.
- C. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide Type 304 stainless steel fasteners.
 - 2. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
 - 3. For interior items, provide fasteners of carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.
 - 4. For exterior items requiring bolts, provide stainless steel with bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2 (ASTM F738M and ASTM F836M, Grade A1 or A4).
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.
- F. Screws for Fastening to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- G. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- H. Bolts: Steel bolts complying with ASTM A307, Grade A (ASTM F568M, Property Class 4.6); with ASTM A563 (ASTM A563M) hex nuts and, where indicated, flat washers.
- I. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC193, and as appropriate for the substrate.

2.6 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.

- B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Adhesives shall have a VOC content of 70 g/L or less.
- C. Water-Repellent Preservative: NWWDA-tested and accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set work to required levels and lines, with members plumb, true to line, cut and fitted. Fit rough carpentry accurately to other construction; scribe and cope as needed. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16-inches on center.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96-inches on center with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96-inches on center. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 square feet and to solidly fill space below partitions.

4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet on center.
- I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 1. Use inorganic boron for items that are continuously protected from liquid water.
 2. Use copper naphthenate for items not continuously protected from liquid water.
- K. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- L. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 1. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code (IBC).
 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One and Two-Family Dwellings.
 3. ICC-ES evaluation report for fastener.
- M. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- N. Nails and Staples:
 1. Use only common wire nails or spikes of the sizes and quantities as indicated on the Drawings.
 2. Do all nailing without splitting wood, pre-boring as required to a diameter smaller than that of the nails. Replace all split members.
 3. Nailing guns:
 - a. When nailing plywood with a nailing gun the nail head shall not crush the plywood, nor shall the nail be under driven.
 - b. Any fastener overdrive shall be considered of no value and shall be replaced with an additional fastener. If the additional nails result in a spacing closer than 1-1/2 inches, if more than 6 fasteners in a row are overdriven, or more than 12 fasteners per piece of plywood are overdriven, the entire piece of plywood shall be removed and replaced.
 - c. If plywood is on both sides of wall only the first side may be nailed with a nailing gun.
 - d. Reference to nails shall also infer staples if used.
 4. For wood-to-wood joints, the spacing center to center of nails shall be not less than the required penetration. Edge or end distances shall be not less than one half of the required penetration. All spacing and edge and end distances shall be such as to avoid splitting of the wood.
- O. Bolts: Drill holes 1/16-inch larger in diameter than the bolts.

P. Screws:

1. For lag screws and wood screws, pre-bore holes same diameter as root of thread; enlarge holes to shank diameter for length of shank.
2. Screw do not drive, any lag and wood screws.
3. Use washers under head of lag-screws where they bear on wood.

Q. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

1. Comply with approved fastener patterns where applicable.
2. Use finishing nails, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

R. Coordinate roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly. Sheathing must not be exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF WOOD GROUNDS, SLEEPERS, BLOCKING, AND NAILERS

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

1. Provide concealed wood blocking and nailers in walls and partitions for attaching equipment, cabinets, and other work.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Attach wood roofing nailers and blocking securely to substrate to resist the designed outward and upward wind loads indicated on Drawings and in accordance with ANSI/SPRI ED-1, Tables A6 and A7.

D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 INSTALLATION OF WOOD FURRING

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Paneling: Install 1-by-3-inch nominal size furring horizontally and vertically at 24-inches on center.

C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal size furring vertically at 16-inches on center.

D. Furring to Receive Plywood: Install 2-by-4-inch nominal size furring vertically at 24-inches on center.

3.4 PROTECTION

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

END OF SECTION 061000

SECTION 070150 - REROOFING PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes:
 - 1. Full tear-off of entire roof assemblies where indicated, including but not limited to slate shingle roofing, single-ply membranes, and sheet metal roofing.
 - 2. Removal of base, valley, ridge, apron, eave and cap/counter flashings, ridge caps, through-wall scupper and drain flashing and all other associated sheet metal.
 - 3. Removal of sheet underlayments, insulation, cover boards, sealants, mastics, and all other associated materials.
 - 4. Temporary roofing.
- B. Related Requirements:
 - 1. Division 01 Section "Summary" for use of premises and for phasing requirements.
 - 2. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for reroofing preparation.
 - 3. Division 02 Section "Selective Demolition" for demolition procedures.
 - 4. Division 06 Section "Rough Carpentry" for wood nailers, cants, curbs, and blocking.
 - 5. Division 07 Section "PVC Roofing" for roof membrane, recovery board, and cover board.
 - 6. Division 07 Section "Slate Shingle Roofing" for new slate shingle roofing.
 - 7. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings and counterflashings.

1.3 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be re-used, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from the Project site.

1.4 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 and glossary in NRCA's "The NRCA Roofing and Roofing Manual: Membrane Roof Systems" apply to work of this Section.
- B. Existing Membrane Roofing Systems: Slate shingle roofing, single ply EPDM/PVC roofing membrane and/or other membranes, surfacing and components and accessories between deck and roofing membrane.
- C. Existing Roof Deck: Structural clay tile with cementitious topping.
- D. Roof Tear-Off: Removal of existing roofing system in its entirety down to roof deck.

- E. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.
- F. Existing to Remain: Existing items of construction that are not indicated to be removed.

1.5 PREINSTALLATION MEETINGS

- A. Preliminary Conference: Before starting removal Work, conduct conference at Project site.
 - 1. Meet with Owner, Architect, OPM, testing and inspecting agency representative, roofing Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing tear-off, including, but not limited to, the following:
 - a. Reroofing preparation, including roofing system manufacturer's written instructions.
 - b. Temporary protection requirements for existing roofing system components that are to remain.
 - c. Existing roof drains and roof drainage during each stage of reroofing, and roof-drain plugging and plug removal.
 - d. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to avoid delays.
 - e. Existing roof deck conditions requiring Architect notification.
 - f. Existing roof deck removal procedures.
 - g. Owner notification.
 - h. Condition and acceptance of existing roof deck and flashing substrate for reuse.
 - i. Structural loading limitations of roof deck during reroofing.
 - j. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that affect reroofing.
 - k. HVAC shutdown and sealing of air intakes.
 - l. Shutdown of fire-suppression, -protection, and -alarm and -detection systems.
 - m. Asbestos removal and discovery of asbestos-containing materials.
 - n. Governing regulations and requirements for insurance and certificates.
 - o. Existing conditions that may require Architect notification before proceeding.

1.6 SUBMITTALS

- A. Product Data: For each type of product.
- B. Qualification Data: For Installer.
- C. Photographs: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations.
 - 1. Submit before Work begins.
- D. Field Test Reports: Fastener pull-out test report.
- E. Landfill Records: Indicate receipt and acceptance of hazardous wastes, such as asbestos-containing material, by a landfill facility licensed to accept hazardous wastes.
- F. Certified statement from manufacturer for existing warranted roof systems to remain, stating that existing roof warranty has not been affected by Work performed under this Section.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Licensed to perform asbestos abatement in the state or jurisdiction where Project is located.
- B. Regulatory Requirements:
 - 1. Comply with governing EPA notification regulations before beginning roofing removal.
 - 2. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately below reroofing area.
 - 1. Conduct reroofing so Owner's operations are not disrupted.
 - 2. Provide Owner with not less than 72 hours' written notice of activities that may affect Owner's operations, adjacent properties, and their operation.
 - 3. Coordinate work activities daily with Owner and place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.
 - 4. Before working over structurally impaired areas of deck, notify Owner to evacuate occupants from below affected area.
 - a. Verify that occupants below work area have been evacuated before proceeding with work over impaired deck area.
- B. Protect building to be reroofed, adjacent buildings, walkways, doors, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- C. Maintain access to existing walkways, doors, and other adjacent occupied or used facilities.
- D. Conditions existing at time of inspection for bid will be maintained by Owner as far as practical.
- E. Limit construction loads on existing roof areas to remain, and existing roof areas scheduled to be reroofed for rooftop equipment wheel loads and for uniformly distributed loads. Do not overload existing structure and deck.
- F. Weather Limitations: Proceed with re-roofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering into existing roofing system or building.
 - 1. Remove only as much roofing in one day as can be made watertight in the same day.
 - 2. The roofing contractor shall not remove more roofing than can be replaced within a given time frame agreed upon by the Owner, Architect, OPM, and General Contractor. The work must proceed in stages.
 - 3. The General Contractor shall coordinate with the roofing sub-contractor to determine the extent of construction on a weekly basis, based on multiple factors including, but not necessarily limited to, anticipated weather, available spaces for storage relocation if required, night activities, the daily work output, etc.
- G. Hazardous Materials:
 - 1. These may be present in the building areas to be re-roofed.
 - 2. A report on the presence of hazardous materials will be provided by the Owner. Examine report to become aware of locations where hazardous materials are present.

3. Hazardous material abatement/remediation is specified by Others. The scope of any abatement work must be included as part of the Roofing sub-contractor's Base Bid.
4. Do not disturb hazardous materials or items suspected of containing hazardous materials except according to procedures specified by Others.
5. Coordinate hazardous material remediation work to prevent water from entering the existing roofing system and building.

PART 2 - PRODUCTS

2.1 TEMPORARY ROOFING MATERIALS

- A. Selection of materials and design for temporary roofing is the responsibility of the roofing contractor.
 1. If temporary roof remains in place, include surface preparation requirements needed to receive permanent roof, and submit a letter from roofing manufacturer stating acceptance of the temporary roof and that its inclusion does not adversely affect the new roofing system's resistance to fire and wind.

PART 3 - EXECUTION

3.1 PREPARATION - GENERAL

- A. Protection of In-Place Conditions:
 1. Protect existing roofing system that is not to be reroofed.
 2. Loosely lay protection over existing roofing in areas not to be reroofed.
 - a. Provide 15/32-inch plywood or OSB panels over 1-inch minimum thick EPS insulation, which extends a minimum of 1-inch past plywood or OSB.
 3. Limit traffic and material storage to areas of existing roofing that have been protected.
 4. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
 5. Comply with requirements of existing roof system manufacturer's warranty requirements.
- B. Seal or isolate windows that may be exposed to airborne substances created in removal of existing materials.
- C. Shut off rooftop utilities and service piping before beginning the Work.
- D. Coordinate with Owner to shut down air-intake equipment on adjacent buildings near the roof Work.
 1. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- E. Test existing roof drains to verify that they are not blocked or restricted.
 1. Immediately notify Architect of any blockages or restrictions.
- F. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday.
 1. Prevent debris from entering or blocking roof drains and conductors.

- a. Use roof drain plugs specifically designed for this purpose.
 - b. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
- 2. If roof drains will be temporarily blocked or unserviceable due to roofing system removal or partial installation of new roofing system, provide alternative drainage method to remove water and eliminate ponding.
 - a. Do not permit water to enter into or under existing roofing system components that are to remain.
- G. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
- H. Lower removed roofing materials to ground and onto lower roof levels, using dust-tight chutes or other acceptable means of removing materials from roof areas.

3.2 ROOF TEAR-OFF

- A. Notify Owner each day of extent of roof tear-off proposed for that day.
 - 1. Remove existing roofing and other roofing system components down to the deck.
 - 2. Remove aggregate, flashings, edgings, and copings.
 - 3. Remove wood blocking, curbs, and nailers.
 - 4. Clean substrates of contaminants such as asphalt, sheet materials, dirt, and debris.
 - 5. Remove fasteners from deck or cut fasteners off at deck surface.
- B. The Work includes a complete tear-off down to bare deck, unless otherwise indicated. **The deck may include cementitious topping over structural decking components. Do not remove the topping.**

3.3 DECK AND ROOF PREPARATION

- A. Inspect deck after full or partial tear-off, depending on location, of roofing system.
 - 1. If broken or loose fasteners that secure deck panels to one another or to structure are observed, or if deck appears or feels inadequately attached, immediately notify Owner and Architect. Do not proceed with installation until directed by Owner and Architect.
 - 2. If deck surface is not suitable for receiving new roofing, or if structural integrity of deck is suspect, immediately notify Owner and Architect. Do not proceed with installation until directed by Owner and Architect.
 - 3. If pitch of existing roof deck is warped or not suitable to maintain free flow of water from surface as indicated by the project documents, immediately notify Owner and Architect. Do not proceed with installation until directed by Owner and Architect.
 - 4. Provide additional deck attachment as required to provide a sound deck.
- B. Remove wet or damp materials below existing roofing and above deck as directed by Architect.
- C. Inspect wood blocking, curbs, and nailers for deterioration and damage.
- D. Repair or reinforce roof deck as indicated on Drawings. Plywood roof and parapet sheathing is specified in Division 06 Sections "Rough Carpentry".

- E. Prior to installing temporary roofing, vacuum roof surface to remove all roofing particles and dust. Coordinate cleaning work with environmental requirements and activities on floors below roof. Cleanup all particles and dust on floors below.

3.4 TEMPORARY ROOFING

- A. Install approved temporary roofing over occupied areas to be reroofed and other areas as required to prevent damage to structures. All structures shall be protected throughout the construction period.
- B. Remove temporary roofing before installing new roofing.

3.5 FASTENER PULL-OUT TESTING

- A. Perform fastener pull-out tests according to SPRI-1 FX-1 and FM Requirements, and submit tests report to Owner, Architect, and roofing manufacturer before installing new roofing systems.
 - 1. Obtain Architect and Structural Engineer approval to proceed with specified fastening pattern and FM requirements.

3.6 DISPOSAL

- A. Collect and place demolished materials in containers.
 - 1. Promptly dispose of demolished materials.
 - 2. Do not allow demolished materials to accumulate on-site.
- B. Dispose of roofing waste in General Contractor provided dumpsters in accordance with Division 01 Section "Construction Waste Management."
- C. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION 070150

SECTION 071416 - COLD FLUID-APPLIED WATERPROOFING

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 cold fluid-applied waterproofing system.
- B. Related Requirements:
 - 1. Division 05 Section "Historic Cast Iron Repair."
 - 2. Division 06 Section "Rough Carpentry."
 - 3. Division 07 Section "Fluid-Applied Air Barriers."
 - 4. Division 07 Section "Fluid-Applied Roofing."
 - 5. Division 07 Section "Joint Sealants."

1.3 COORDINATION

- A. Coordinate Work under this Section with adjacent roofing and waterproofing work, including slate roofing, single-ply membrane roofing, and fluid-applied roofing.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including, but not limited to, the following:
 - a. Surface preparation specified in other Sections.
 - b. Minimum curing period.
 - c. Forecasted weather conditions.
 - d. Special details and sheet flashings.
 - e. Repairs.
 - f. Field quality control.

1.5 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
 - 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrates.
- B. Shop Drawings:
 - 1. Show locations and extent of waterproofing.

2. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Samples:
 1. Cured sample of waterproofing membrane on suitable rigid substrate, 8 by 8 inches.
- D. Qualification Data: For Installer.
- E. Field quality-control reports.
 1. Watertightness integrity test results.
- F. Construction Waste Management Plan: Including removal of media and waste from blast cleaning operations.
 1. Refer to Division 01 Section "Construction Waste Management and Disposal."
- G. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum of 20 years of experience in the production and sales of waterproofing.
 1. Waterproofing manufacturer shall have available an in-house technical staff to assist the contractor when necessary in the application of the products and site review of the assembly.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.
- C. Mock-ups
 1. Build mockups to verify selections made under Sample submittals and to set quality standards for installation.
 - a. Build mockup for each typical waterproofing installation and each type of transition to adjacent systems, including accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.
 - b. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer.
 1. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.
 2. Do not apply waterproofing in snow, rain, fog, or mist, or when such weather conditions are imminent during application and curing period.
- B. Maintain adequate ventilation during application and curing of waterproofing materials.
- C. Protection of Adjacent Materials:

1. Protect all existing adjacent materials and surfaces during the execution of the Work. Provide all necessary protection and work procedures to avoid waterproofing contact and other damage to adjacent stonework, glass, ornamental metals, hard and soft landscape materials, sidewalks, utilities, equipment, and all other existing and new exterior materials, and assemblies.
2. Repair all damage to adjacent materials caused by the execution of the Work of this section at no expense to Owner. Damaged materials shall be repaired or replaced by mechanics experienced in the respective type of work, to the satisfaction of the Architect.
3. Maintain a clean work area at all times. Clean up materials and equipment; sweeping clear the area of all debris matter. Clean-up shall occur minimally once a day at the end of each shift.

1.8 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.
1. Warranty Period: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations:
1. Fluid-Applied Waterproofing System, Fluid-Applied Air Barrier, and Fluid-Applied Roofing System: Obtain materials and accessories for all fluid-applied waterproofing, air barrier, and fluid-applied roofing systems from single source from single manufacturer.
- B. Manufacturers:
1. Basis-of-Design Manufacturer:
 - a. Henry, a Carlisle Company.
 2. Alternate Manufacturers: Subject to compliance with specifications and evaluation by Architect and Owner, provide approved equivalent waterproofing and roofing systems from alternate single-source manufacturer, including but not limited to the following. Refer to source limitations above.
 - a. Sika Corporation.
 - b. Soprema USA.

2.2 FLUID-APPLIED WATERPROOFING

- A. Fluid-Applied Waterproofing: Instant setting, spray-applied polyurethane or polyurethane-hybrid waterproofing.
1. 100 percent solids waterproofing membrane, having the following typical properties:
 - a. Rain ready within 1 hour
 - b. Foot traffic ready within 1 hour
 - c. UV Resistance: Permanent UV exposure
 - d. Crack bridging (ASTM C1305): Pass
 - e. Complies with ASTM C836
 - f. Tensile Strength: 900 psi (6.2 MPa) minimum; ASTM D638.

- g. Elongation at Break: 300 percent minimum; ASTM D638.
- 2. Basis of Design:
 - a. Prodeq FX 400 by Henry.

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials recommended in writing by waterproofing manufacturer for intended use and compatible with one another and with waterproofing.
 - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory formulated as recommended in writing for substrate by waterproofing manufacturer.
- C. Sheet Flashing: Manufacturer's standard flashing sheet.
 - 1. Adhesive: Manufacturer's recommended contact adhesive.
- D. Membrane-Reinforcing Fabric: Manufacturer's recommended fiberglass mesh or polyester fabric, manufacturer's standard weight.
- E. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.
- F. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing; ASTM C920, Type M, Class 25 or greater; Grade NS for sloping and vertical applications and Grade P for deck applications; Use NT exposure; and as recommended by manufacturer for substrate and joint conditions.
 - 1. Backer Rod: Closed-cell polyethylene foam.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
 - 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.
 - 3. Verify surfaces are sound, clean, dry, and free of oil, grease, dirt, excess mortar, frost, laitance, loose and flaking particles, or other contaminants.
 - 4. Verify substrates are continuous and secure, smooth and without large voids, spalled areas, or sharp protrusions.
 - 5. Verify cold joints are on the same plane.
 - 6. Verify penetrations are in place, including coping, railings, flashing, electrical conduit, pipes, pedestals, and curbs.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
 - 1. Metal Surfaces:
 - a. Clean using methods recommended in writing by waterproofing manufacturer, but not less than as per SSPC-SP6/NACE No. 3 to remove corrosion deposits back to a clean, bright metal followed by a solvent wipe prior to application of the specified primer.
 - b. Clean metal, remove debris and sharp edges, and immediately prime substrate to avoid flash rusting.
 - 2. Disposal of cleaning materials:
 - a. It is the Contractor's sole responsibility to collect, package and dispose of materials used in the cleaning process. All media and waste from blast cleaning operations shall be captured and fully contained from the surface of the work to the point of removal from the site; prevent contact with building surfaces, public circulation, and existing drainage systems.
 - b. Disposal shall be in accordance with regulations enacted by appropriate governmental agencies and Authorities Having Jurisdiction.
 - c. Refer to Division 01 Section "Construction Waste Management and Disposal" for Waste Management Plan requirements.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Close off adjacent drains to prevent spillage and migration of waterproofing fluids.
- D. Prepare substrates 2 inches (50 millimeters) minimum beyond area of anticipated waterproofing.
- E. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from surfaces.
- F. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

3.3 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS

- A. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners according to waterproofing manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471.

3.4 JOINT AND CRACK TREATMENT

- A. Prepare, treat, rout, and fill joints and cracks in substrate according to waterproofing manufacturer's written instructions and to recommendations in ASTM C898 and ASTM C1471. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D4258.
 - 1. Comply with ASTM C1193 for joint-sealant installation.
 - 2. Apply bond breaker on sealant surface, beneath preparation strip.

3. Prime substrate along each side of joint and apply a single thickness of preparation strip at least 6-inches wide along each side of joint. Apply waterproofing in two separate applications and embed a joint reinforcing strip in the first preparation coat.
- B. Install sheet flashing where required according to waterproofing manufacturer's written instructions.
 1. Extend sheet flashings for 4-inches onto perpendicular surfaces and items penetrating substrate.

3.5 INSTALLATION OF WATERPROOFING

- A. Apply waterproofing according to manufacturer's written instructions and to recommendations in ASTM C898 and ASTM C1471.
- B. Start installing waterproofing in presence of manufacturer's technical representative.
- C. Apply primer over prepared substrate unless otherwise instructed in writing by waterproofing manufacturer.
- D. Install waterproofing membrane at 100 mils minimum to form a continuous monolithic membrane over horizontal and vertical surfaces.
 1. Do not install waterproofing beyond cured primer.
- E. Cure waterproofing, taking care to prevent contamination and damage during application and curing.

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components and to furnish reports to Architect.
 1. Refer to Waterproofing Manufacturer for warranty requirements.
 2. Observe waterproofing installation during the following phases, minimum:
 - a. Substrate verification.
 - b. Waterproofing membrane installation start.
 - c. Final inspection of waterproofing assembly prior to cladding installation.
- B. Waterproofing will be considered defective if it does not pass tests and inspections.

3.7 PROTECTION

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

END OF SECTION 071416

SECTION 072726 - FLUID-APPLIED AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes vapor-permeable fluid-applied membrane air barriers in exterior assemblies.
- B. Related Requirements:
 - 1. Division 05 Section "Historic Cast Iron Repair."
 - 2. Division 06 Section "Rough Carpentry."
 - 3. Division 07 Section "Cold Fluid-Applied Waterproofing."
 - 4. Division 07 Section "Fluid-Applied Roofing."
 - 5. Division 07 Section "Joint Sealants."

1.3 DEFINITIONS

- A. Air-Barrier Accessory: A transitional component of the barrier that provides continuity.
- B. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air and water movement through the wall; which in turn provides a full system warranty.
- C. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air and water.

1.4 PREINSTALLATION MEETINGS

- A. Pre-Installation Conference: Conduct conference at Project site.
 - 1. Include installers of other construction connecting to air barrier, including but not necessarily limited to roofing, waterproofing, architectural precast concrete, masonry, sealants, windows, glazed aluminum curtain walls, storefronts, door frames, and louvers.
 - 2. Review air-barrier requirements and installation, surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details, flashings, mockups, installation procedures and sequencing, air-leakage and bond testing, air-barrier protection and repairs, and work scheduling that covers air barriers.
 - 3. Conduct two (2) meetings; hold first meeting prior to installation of substrate materials and second meeting after substrate installation is complete.

1.5 SUBMITTALS

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

1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.
2. Additional Documentation:
 - a. For coatings, indicating VOC content.
 - b. Laboratory Test Reports: For coatings, indicating compliance with requirements for low-emitting materials.
- B. Shop Drawings: For air-barrier assemblies.
 1. Show locations and extent of air barrier materials, accessories, and assemblies specific to Project conditions.
 2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 3. Include details of interfaces with other materials that form part of air barrier.
- C. Qualification Data: For Installer; provide a list of ABAA-certified installers and supervisors employed by the Installer, who work on this Project.
- D. 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.
- E. Product Test Reports: For each assembly, for tests performed by a qualified testing agency.
- F. Warranty: Submit manufacturer's sample warranty.
- G. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by the manufacturer.
 1. Installer shall be experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
 2. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.
- B. Mockups: Build mockups to set quality standards for materials and execution.
 1. Before beginning installation of air barrier, build mockups of exterior wall assembly, as shown on Drawings, or if not delineated provide a mock-up of approximately 8-feet by 8-feet, incorporating backup wall construction, external cladding, ties and other penetrations, and flashings to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
 - a. Coordinate construction of mockups to permit inspection by Architect, Owner, and Owner's Testing Agency of air barrier before cladding is installed.
 - b. Include transitions to adjacent systems.
 - c. Mock-up will be reviewed and approved in stages. Architect will review substrate prep and penetration prep as part of first stage. The second stage review will encompass installed air barrier and tie-ins to adjacent construction.

- d. If Architect determines mockups do not comply with requirements, reconstruct mockups, and apply air barrier until mockups are approved.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

- A. Mockup Testing: Air barrier assemblies shall comply with performance requirements indicated, as evidenced by reports based on manufacturers laboratory testing and on-site mockup testing or in-place sample wall testing by a qualified testing agency.
 1. Air-Leakage-Location Testing: Test for evidence of air leakage according to ASTM E1186, chamber depressurization with detection liquids.
 2. Air-Leakage-Volume Testing: Test for air leakage rate according to ASTM E783.
 3. Adhesion Testing: Test required air-barrier adhesion to substrate as per ASTM D4541.
 4. Notify Architect seven (7) days in advance of the date and time when testing will occur.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in labeled packages.
- B. Store materials in accordance with manufacturer's written instructions.
- C. Protect stored materials from direct sunlight, weather, and construction activities.
- D. Remove and replace liquid materials that cannot be applied within their stated shelf life.

1.9 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 barrier performance.
 2. Do not apply barrier to a damp or wet substrate; or during snow, rain, fog or mist.
 3. Provide temporary protection in accordance with manufacturer requirements and other Division 01 specification Section requirements.

1.10 WARRANTY

- A. Material Warranty: Manufacturer's standard form in which manufacturer agrees to replace fluid-applied membrane air barrier system, including all integral materials and components, which fail within specified warranty period when installed in conformance with written manufacturer's instructions.
 1. Failures include, but are not limited to, failure to maintain air and vapor perm ratings indicated when tested as per indicated ASTM Standards.
 2. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Source Limitations:

1. Fluid-Applied Waterproofing System, Fluid-Applied Air Barrier, and Fluid-Applied Roofing System: Obtain materials and accessories for all fluid-applied waterproofing, air barrier, and fluid-applied roofing systems from single source from single manufacturer.

B. Manufacturers:

1. Basis-of-Design Manufacturer:
 - a. Henry, a Carlisle Company.
2. Alternate Manufacturers: Subject to compliance with specifications and evaluation by Architect and Owner, provide approved equivalent waterproofing and roofing systems from alternate single-source manufacturer, including but not limited to the following. Refer to source limitations above.
 - a. Sika Corporation.
 - b. Soprema USA.

2.2 PERFORMANCE REQUIREMENTS

- A. Air Barrier Performance: Air barrier assembly and seals with adjacent construction to be capable of performing as a continuous vapor-permeable 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.
1. Air barrier shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the exterior envelope without damage or displacement and shall transfer loads to the structure. No displacement of adjacent materials under full load is allowable.
 2. Connections must be made between all foundations, walls, windows, doors, roof vapor barriers, control and expansion joints; and utility, pipe, conduit, and duct penetrations.
 3. Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide coordination of the trades, and the sequence of construction to ensure continuity of the air barrier system. Provide quality assurance procedures, testing and verification as specified herein. Facilitate inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction or by the Owner.
- B. Air-Barrier Assembly Air Leakage: Pass, ASTM E2357.
- C. Vapor Permeance: 14 perm; ASTM E96/E96M, Method B.
- D. Ultimate Elongation: Minimum 250% as per ASTM D412.
- E. Adhesion to Substrate: Minimum 30 lbf/sq. in. when tested in accordance with ASTM D4541.
- F. Fire Propagation Characteristics: Complies with NFPA 285 in various wall assemblies.

- G. UV Resistance: Can be exposed to sunlight for a minimum of thirty (30) calendar days in accordance with manufacturer's written instructions.

2.3 AIR BARRIERS

- A. Fluid-Applied, Vapor-Permeable Air Barrier (Fluid-Applied AVB): Synthetic polymer material with an installed dry film thickness according to manufacturer's written instructions, over smooth, void-free substrates.
 - 1. Basis of Design:
 - a. Henry Company; Air-Bloc 17MR

2.4 ACCESSORY MATERIALS

- A. Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Membrane Flashings: Self-adhesive sheet membrane flashing recommended by air-barrier material manufacturer.
 - 1. Flashing products and air barrier products must be compatible. Obtain written documentation of acceptance and compatibility from each product manufacturer.
 - 2. Adhesives and Primers: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
 - 3. Termination Bars: Provide 1/8-inch by 1-inch stainless steel bars with sealant lip at the top of all flashings.
- C. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.
- D. Stainless-Steel Sheet: ASTM A240/A240M, Type 304, 0.0187-inch thick, and Series 300 stainless-steel fasteners.
- E. Joint Sealant: ASTM C920, 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 Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that substrates have cured and aged for minimum time period recommended in writing by air barrier manufacturer.

3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D4263.
4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate in accordance with manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete and CMU with substrate-patching material.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- H. Bridge isolation joints, expansion joints, and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.
- I. Joint Treatment:
 1. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.
 - a) Prime substrate and apply a single thickness of air-barrier manufacturer's recommended preparation coat extending a minimum of 4-inches along each side of joints and cracks. Apply a double thickness of fluid air-barrier material and embed a joint reinforcing strip in preparation coat.

3.3 INSTALLATION OF ACCESSORIES

- A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 2. Install transition strip on roofing or waterproofing membrane or base flashing so that a minimum of

- 4-inches of coverage is achieved over each substrate.
3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid applied air-barrier material on same day. Re-prime areas exposed for more than twenty-four (24) hours.
 - a) Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtainwalls, storefronts, and doors. Apply flashings so that a minimum of 4-inches of coverage is achieved over each substrate. Maintain 4-inches of full contact over firm bearing to perimeter frames with not less than 1-inch of full contact. Refer to the Architectural Details for additional requirements.
1. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6-inches on center. Apply lap sealant over exposed edges and on cavity side of flashing sheet. Overlap with fluid applied air barrier a minimum of 4-inches.
 2. Transition Strip: Roll firmly to enhance adhesion.
 3. Preformed Silicone Extrusion: Provide at all aluminum windows, curtainwall, and storefront assemblies. Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with low expansion spray foam sealant.
- G. Seal strips, transition strips, and flashings around masonry reinforcing or ties and penetrations with termination mastic. Overlap edges with fluid applied air barrier.
- H. Seal top of through-wall flashings to air barrier with an additional 6-inch wide, transition counterflashing strip. Overlap top with fluid applied air barrier a minimum of 4-inches.
- I. Seal exposed edges of strips and flashings at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic. Overlap edges with fluid applied air barrier.
- J. Repair punctures, voids, and deficient lapped seams in strips and transition strips and flashings. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6-inches beyond repaired areas in strip direction. Overlap edges with fluid applied air barrier.

3.4 INSTALLATION OF PRIMARY AIR-BARRIER MATERIAL

- A. Apply air-barrier material to form a seal with strips, flashings, and transition strips and to achieve a continuous air barrier system according to air-barrier manufacturer's written instructions and details, and as shown on the Architectural Drawings. Apply air-barrier material within manufacturer's recommended application temperature ranges.
 - 1. Unless manufacturer recommends in writing against priming, apply at least one coat of 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. Re-prime areas exposed for more than twenty-four (24) hours.
 - 3. Where multiple prime coats are needed to achieve required bond, with adequate drying time between coats.
- B. Apply continuous unbroken air barrier material to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties, drains, electrical boxes and conduit, fire protection piping, mechanical devices, etc.
 - 1. Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements.
 - 2. Apply in a minimum of two (2) equal coats as necessary to meet performance requirements and as recommended by manufacturer.
 - 3. Apply additional coats as required to achieve void and pin hole free surface.
- C. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.
- D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.5 FIELD QUALITY CONTROL

- A. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections will include the following:
 - 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 - 2. Air barrier dry film thickness.
 - 3. Continuous structural support of air-barrier system has been provided.
 - 4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
 - 5. Site conditions for application temperature and dryness of substrates.
 - 6. Maximum exposure time of materials to UV deterioration has not been exceeded.
 - 7. Surfaces have been primed, where required.
 - 8. Laps in flashings and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 - 9. Termination mastic has been applied on all cut edges.
 - 10. Flashings and transition strips have been firmly adhered to substrate.
 - 11. Compatible materials have been used.
 - 12. Transitions at changes in direction and structural support at gaps have been provided.
 - 13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 - 14. All penetrations have been sealed.

- B. Tests:
 - 1. Adhesion Testing: Air-barrier assemblies shall be tested for required adhesion to substrate according to ASTM D4541 for each 500 sq. ft. of installed air barrier or part thereof.
 - 2. Thickness Testing: As recommended by manufacturer.
- C. Contractor Requirements:
 - 1. Conduct a pre-test planning meeting with the OPM, Owner, Architect, Testing Agency, Air Barrier Sub-Contractor, and other sub-contractors as may be required. Establish test boundaries for each test.
 - 2. Install all flashings, transitions, terminations, closures, etc.
 - 3. Seal all penetrations through the exterior envelope.
 - 4. Adhesion and thickness tests will be performed after passing visual inspections.
 - 5. Upon completion of inspection, testing, sample taking and similar services; repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for Division 01 Section "Execution."
 - 6. Protect construction exposed by or for quality-control service activities.
 - 7. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.
- D. 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 as specified above.
 - 3. No claims for additional cost and/or time will be entertained for failure or testing and remedial actions required to correct the Work and re-test.
- E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
- F. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 - 1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than thirty (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 in writing by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 073126 – SLATE SHINGLE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes:
 - 1. Slate shingle roofing assembly.
 - a. Dome: Roof replacement over existing clay tile deck and new wood sheathing.
 - b. Sloped pavilion roofs: Roof replacement over existing clay tile deck and new wood sheathing.
 - 2. Roofing felt, sheet membrane underlayment, fasteners, vents, trim, sealants, and other accessory materials.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for blocking, cant strips and nailers.
 - 2. Division 07 Section "Preparation for Re-Roofing" for roof deck preparation.
 - 3. Division 07 Section "Sheet Metal Fabrications and Flashing" for metal flashings.
 - 4. Division 07 Section "Joint Sealants" for field-applied sealants.

1.3 DEFINITIONS

- A. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to slate roofing including, but not limited to, the following:
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, slate roofing Installer, manufacturer's representative for slate roofing, and installers whose work interfaces with or affects slate roofing including installers of roof accessories and roof-mounted equipment.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to slate roofing installation.
 - 4. Examine existing roof deck or newly installed replacement roof decking conditions for compliance with requirements, including flatness and attachment to structural members.

5. Review structural loading limitations of existing roof deck during and after roofing.
6. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect slate roofing.
7. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
8. Review temporary protection requirements for slate roofing during and after installation.
9. Review roof observation and repair procedures after slate roofing installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.
- B. Shop Drawings: Include plans, elevations, and sections at hips, ridges, and eaves; component details; accessories; and attachments to other Work.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of slate shingle indicated.
- D. Samples for Verification: Full-size units for each type of slate shingle indicated; in sets for each color, texture, shape, and size specified, showing the full range of variations expected. Prepare Samples from the same material to be used for the Work. Three (3) fasteners of each type, length and finish.

1.6 INFORMATIONAL SUBMITTALS

- A. Material Test Reports: For each slate variety, based on evaluation of comprehensive tests performed by a qualified testing agency.
- B. Evaluation Reports: For synthetic underlayment, from ICC-ES or other testing and inspecting agency acceptable to authorities having jurisdiction, indicating that product is suitable for intended use under applicable building codes.

1.7 QUALITY ASSURANCE

- A. Source Limitations for Slate: Obtain each variety of slate from one source with resources to provide materials of consistent quality in appearance and physical properties.
- B. Installer Qualifications: A single installer ("Roofer") shall perform the work of this section; and shall be a firm with not less than five (5) years of successful experience in installation of slate shingle roofs similar to those required for this project and which is acceptable to or licensed by the manufacturer of primary roofing material.
 1. Installer's Field Supervision: Installer must maintain a full time supervisor/foreperson on the jobsite during times that roofing work is in progress. Supervisor must have a minimum of five (5) years of experience in roofing work similar to nature and scope of the specified roofing.

- C. Mockups: Before installing slate shingle roofing, build mockups for each form of construction and condition required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
1. As indicated in Division 07 Section "Preparation for Re-Roofing", perform pull testing of various copper and stainless steel fastener types into existing roof decks to confirm fastener pull-out strengths, types and lengths.
 2. Contractor shall document existing pattern, slate thicknesses and sizes during removal and shall construct a full size storypole of each existing roof area. The contractor shall retain a minimum of four (4) slates from each course in order to replicate the existing roof. Storypole shall demonstrate slate pattern, slate thicknesses, slate sizes and exposure(s).
 3. Build mockups in locations identified by Owner and Architect. Size of mock-up shall be full-size to match size of storypole and shall be constructed adjacent to storypole.
 - a. Include deck; underlayments; shingles; attachment provisions and devices; flashing; gutter lining; applied plastic cement; and other accessories required.
 - b. Coordinate slate shingle roofing mock-up with those specified in other Sections.
 4. Notify Architect seven (7) days in advance of dates and times when mockups will be constructed.
 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 6. Obtain Architect's approval of mockups before starting slate shingle roofing construction.
 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 8. Demolish and remove mockups when directed.
 9. Approved mockups may become part of the completed work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver slate shingles to Project site and store as close as possible to the point of installation to minimize damage while handling.
- B. Store and handle roofing materials to prevent breakage and ensure dryness. Store in a dry, well-ventilated, weathertight place. Store rolls of felt and other sheet materials on end on pallets or another raised surface.
- C. Do not leave unused felts on roof overnight or when roofing work is not in progress unless protected from weather or other moisture sources.
- D. Handle and store materials and equipment in a manner to avoid significant or permanent deflection of deck.

1.9 SPECIAL PROJECT WARRANTY:

- A. Upon completion of the Work and as a condition of its acceptance, deliver to the Owner a written warranty signed by the Installer and Contractor, stating that the entire installed slate roofing system, including all related flashings, underlayments and all other items comprising the roofing system, will remain intact and free from leaks for a period of at least ten (10) years following the date of final acceptance and that all replacements and/or repairs will be made promptly to the satisfaction of the Architect at the Contractor's own expense.

1.10 PROJECT CONDITIONS:

- A. Coordinate Work with Work of other Sections to ensure a complete and watertight job.
- B. Do not perform any work during periods of rain or snow.
- C. Do not apply materials to wet surfaces or apply wet and damp materials to roof deck.
- D. Protection of Building:
 - 1. Protect from Weather: Carry out all roofing operations in a manner that will ensure that the building and its contents are protected from damage by rain, wind and other weather related conditions at all times.
 - 2. Storage: Store existing slate to avoid overloading or damaging existing structure or surfaces to prevent damage to the slate.
 - 3. Damage: Contractor is responsible for repairing or replacing all elements of building and its contents damaged and/or deteriorated as the result of the work in this Section.

1.11 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Slate Shingles: Full-size units equal to 1 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide slate shingles by one of the following:
 - 1. Buckingham-Virginia Slate Corp.
 - 2. Evergreen Slate Co., Inc.
 - 3. Greenstone Slate company
 - 4. New England Slate Co.
 - 5. North Country Slate Company
 - 6. Vermont Structural Slate Company, Inc.
 - 7. Virginia Slate Co.

2.2 SHINGLES

- A. Slate Roof Shingles: Hard, dense, sound rock. No broken or cracked slates, no broken exposed corners, and no broken corners on covered ends that could sacrifice nailing strength or laying of a watertight roof. No ribbons in exposed portion of shingle, and curvature not to exceed 1/8 inch per 12 inches.
 - 1. Basis of Design:

- a. Semi-weathering gray slate from Vermont quarries known to show range of gray-green, bronze, and buff tone on traditional gray base.
 - 1) "Vermont Gray" by New England Slate.
 - 2) "Vermont Semi-Weathering Gray" by Vermont Slate Co.
 - 3) Approved equal.
2. Classification: ASTM C 406.
 - a. Grade S1: Expected service life more than 75 years.
3. Thickness and Surface Texture: 3/16" min.; thickness and surface texture to match existing.
4. Length:
 - a. Length to match existing; exposure to match existing with 3-inch lap.
5. Width:
 - a. Width to match existing.
6. Butt Shape: Rounded cut to match existing.
7. Weather-Exposure Color Change: To match existing.
8. Color: Match color range of existing slate shingles.
9. Starter Slate: Slate shingles with chamfered nail holes front-side punched.
 - a. Length: Exposure of slate shingle plus headlap.
10. Fastener Holes: Pre-punched and countersunk for two (2) nails located for proper head lap. Fastener holes shall not be field drilled or punched.

B. Physical Requirements:

1. Slates with a strong grain must be produced "on the grain", that is, the direction of the grain of the stone must be parallel to the long dimension of the shingle. Slates shall be randomly selected from each shipment and tested for grain direction to ensure proper fabrication.
2. Broken corners on the exposed ends of slates are not permitted. Broken corners on the unexposed ends may be considered cause for rejection when either the base or leg of the right triangular piece broken off is greater than 1 1/2 inches.
3. The curvature of shingles shall not exceed 1/8 inch in 12 inches. Curved slates shall be sheared and punched to permit them to be laid with the convex side up.
4. "Knots" and "knurls" are rounded defects that affect the smoothness of split. They are not acceptable on any portion of the slate. Even though the slates could be laid without consequence, if the defect were on the exposed portion, it would cause adjacent slates to fracture when packed within the pallet or crate. Slates with a protuberance of more than 1/16 inch beyond the split surface shall be cause for rejection.
5. Slates shall be free from ribbons and cracks.
6. Face dimensions shall not differ from those specified by more than 1/8 inch.
7. Slates shall not have quartz veins running through them.
8. Large iron pyrites within the slates shall be cause for rejection.
9. Slates that are wedge shaped (tapering to less than 3/16 inch in thickness) are unacceptable.
10. Contractor shall sound each slate shingle prior to installation. Slates should ring when tapped with knuckles. Unsound slates shall not be installed.

2.3 UNDERLAYMENTS

- A. Felt Underlayment: ASTM D 226, Type II, No. 30 asphalt-saturated organic roofing felt; minimum 36-inch- wide rolls.
- B. Self-Adhering, High-Temperature Waterproofing Membrane: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Grace Ultra by GCP Applied Technologies (CertainTeed Saint-Gobain)
 - b. WIP 300HT by Carlisle WIP Products; a brand of Carlisle Construction Materials.
 - c. Grace Ice and Water Shield HT by GCP Applied Technologies Inc.
 - d. Blueskin PE200 HT by Henry Company.
 - 2. Source Limitations: Obtain underlayment from single source from single manufacturer.
 - 3. Low-Temperature Flexibility: ASTM D1970; passes after testing at -20 deg F or lower.

2.4 FASTENERS

- A. Roofing Nails: 0.1055-inch- diameter-shank, hot-dip galvanized steel, Type ES, barbed-shank roofing nails; minimum 3/8-inch- diameter head, and long enough to penetrate 3/4 inch into solid decking or to penetrate through plywood sheathing.
 - 1. Nail type and length shall be confirmed as part of pull-out testing outlined in Part 1.
- B. Slating Nails: ASTM F1667, 0.135-inch, diamond-point, smooth-shaft, copper or stainless steel slating nails with large head; minimum 3/8-inch diameter, and long enough to penetrate a minimum of 3/4 inch into sheathing or deck, or extend at least 1/8-inch through sheathing less than 3/4" thick.
 - 1. Nail type and length shall be confirmed as part of pull-out testing outlined in Part 1.
 - 1. Minimum Nail Length for Shingles 3/16 Inch Thick or Less:
 - a. For Shingles 18 inches or Less in Length: 1-1/4 inches long.
 - b. For Shingles 20 inches or More in Length: 1-1/2 inches long.
 - c. For Hip and Ridge Shingles: 2 inches long.
 - 2. Minimum Nail Length for Shingles More Than 3/16 Inch Thick: Two times the shingle thickness plus 1 inch.

2.5 SHEET METAL FLASHING AND TRIM

- A. General: Comply with requirements in Section 076200 "Sheet Metal Fabrications and Flashing."
 - 1. Sheet Metal: Copper.
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for design, dimensions, metal, and other characteristics of the item.

1. Apron Flashings: 20 oz., fabricate with lower flange extending a minimum of 6 inches over and 4 inches beyond each side of downslope slate shingles and 6 inches up the vertical surface.
 2. Step Flashings: 20 oz., fabricate with a head lap of 3 inches and a minimum extension of 5 inches both horizontally and vertically.
 3. Cricket and Backer Flashings: 20 oz., fabricate with concealed flange extending a minimum of 24 inches beneath upslope slate shingles and 6 inches beyond each side of chimney and 6 inches above the roof plane.
 4. Hip Flashings: 16 oz., fabricate to length of slate shingle and to extend minimum of 3 inches beyond joint of hip shingle with adjoining roof shingle.
 5. Bibs: 16 oz. fabricate bibs to be 6 inches by 8 inches with chevron cuts, three (3) per side.
 6. Drip Edges: 20 oz., fabricate in lengths not exceeding 10 feet with roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
 - a. Roof-Deck Flange at Eaves: Form to cover cant strip and fasten to roof deck.
 - b. Roof-Deck Flange at Rakes: Form to extend 4 inches onto roof deck.
- C. Vent-Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches from pipe onto roof.

2.6 ACCESSORIES

- A. Plastic Cement: ASTM C 1085, one-part, nonsag, nonstaining, solvent-release-curing, polymerized butyl sealant formulated with minimum of 75 percent solids; with a tack-free time of 24 hours or less.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Chem-Calk 300; Bostik Inc.
 - b. PTI 757; H.B. Fuller Company.
 - c. BC-158; Pecora Corporation.
 - d. PSI 301; Polymeric Systems, Inc.
 - e. Sonneborn Multi-Purpose Sealant; Sonneborn Building Products, Div. of ChemRex, Inc.
 - f. Tremco Butyl Sealant 505; Tremco, Inc.
- B. Joint Sealant: One-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant as recommended in writing by shingle manufacturer. Where sealant will be exposed, provide in color matching shingle.
- C. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- D. Cants: Wood cants for installing underneath the starter course of shingles shall be a minimum of 1/4 inch by one inch plaster lath or other solid glue free wood. Alternatively, minimum 16 ounce lead coated copper edging with a built-in cant may be used. When installing standard thickness slates (3/16" to 1/4" thick) the cant should be approximately 1/4" to 3/8". Thicker slates will require a greater cant.
- E. Ridge and Hip Covers and Flashing: Custom formed for project ridge and hip conditions.

1. Accessories: Fabricate flashing, splices, end caps, and other accessories from matching metal according to SMACNA procedures and details.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrate and conditions under which slate shingle Work is to be performed; notify Contractor in writing of unsatisfactory conditions. Proceed with slate shingle Work only after unsatisfactory conditions have been corrected.
 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provisions have been made for flashings and penetrations through roofing.
 2. Verify that vent stacks and other penetrations through roofing are installed and securely fastened.
- B. Cover or otherwise plug drains to prevent entrance of slate shingle trimmings and debris.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Sheet Metal Flashing Installation: Install sheet metal flashing, vent flashing, and edge protection as indicated and in compliance with details and recommendations of NRCA's "Steep Roofing Manual."
 1. Where flashings occur perpendicular to slope, return sheet metal a minimum of 4 inches under shingles.
- B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 4 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with underlayment nails.
 1. Install felt underlayment on wood sheathing at roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 4 inches in direction that sheds water. Lap ends of felt not less than 6 inches over self-adhering sheet underlayment.
 2. Install fasteners at no more than 12 inches o.c. between side laps and 6-inch spacing at side laps.
- C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer, if applicable. Install lapped in direction that sheds water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches, staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven (7) days.

1. Prime new wood sheathing over terra cotta roof deck, and masonry surfaces to receive self-adhering sheet underlayment.
 2. Extend self-adhering sheet underlayment over entire roof sheathing on existing roof deck at metal roofing areas.
 3. Eaves: Extend from edges of eaves 36 inches beyond interior face of exterior wall.
 4. Rakes: Extend from edges of rakes 36 inches beyond interior face of exterior wall.
 5. Hips: Extend 18 inches on each side.
 6. Ridges: Extend 36 inches on each side.
 7. Valleys: Extend 36 inches on each side.
 8. Sidewalls: Extend 18 inches beyond sidewalls and return vertically against sidewalls not less than 4 inches.
 9. Roof-Penetrating Elements: Extend 18 inches beyond penetrating elements and return vertically against penetrating elements not less than 4 inches.
 10. Roof-Slope Transitions: Extend 18 inches on each roof slope.
- D. Slate Shingle Installation: Beginning at eaves, install slate shingles according to manufacturer's written instructions and to details and recommendations in NRCA's "NRCA Roofing Manual: Steep-Slope Roof Systems."
1. Install metal cant at eave edges under roof edge flashing.
 2. Install shingle starter course chamfered face down.
- E. Install first and succeeding shingle courses chamfered face up. Install full-width first course at rake edge.
1. Offset joints of random-width slate shingles a minimum of 3 inches in succeeding courses. When installed, slates shall be butted side to side touching, or with a maximum 1/8" gap between slates, on average.
- F. Maintain a 3-inch-head lap between succeeding shingle courses. Exposures shall match the existing at each roof area.
- G. Extend shingle starter course and first course 1-1/2 inches over fasciae at eaves.
- H. Extend shingle starter course and succeeding courses 1 inch over fasciae at rakes.
- I. Provide exposure pattern that matches the existing roofing, approved storypole mock-up and approved shop drawings at each roof area.
- J. Cut and fit slate neatly around roof vents, pipes, ventilators, and other projections through roof. Slates are to be cut from the backside in order to preserve the chamfered edge.
- K. Hang slate with two (2), or four (4) for larger shingles, slating nails for each shingle with nail heads lightly touching slate. Do not drive nails home, which draws slates downward, and do not leave nail heads protruding enough to interfere with the overlapping shingle above.
- A. Hips: Install and anchor slate hips in mitered configuration, to match existing.
1. Install and anchor wood nailer strips of thickness to match abutting courses of slate shingles.
 - a. Cover nailer strip with self-adhering, polymer-modified bitumen sheet extending on to underlying slate but concealed by hip slate.

- b. Anchor hip slate to nailer strip with two (2) nails located in upper third of hip-slate length.
 - 2. Seal hip centerline joint with elastomeric sealant.
- B. Remove and replace damaged or broken slate shingles.

3.3 ADJUSTING AND CLEANING

- A. Contractor shall visually and manually inspect the slates when roof brackets are removed to make sure no slates were broken by the roof scaffolding. Upon completion, all slate shall be sound, unbroken, un-cracked, whole and clean, showing no exposed roof cement. Remove and replace damaged or broken slates.
- B. Individual slates that must be installed in the field of the roof after the installation is complete, such as where a roof bracket had been removed or where a repair has been made, shall be installed using the stainless steel or copper slate hooks or the nail and bib installation method where standard nailing is not possible.
- C. Remove excess slate and debris from Project site.

END OF SECTION 073126

SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes the following:
 - 1. Fully adhered polyvinyl-chloride (PVC) roofing system.
 - a) East pavilion roofs.
 - 2. Accessory roofing materials.
 - 3. Roof insulation, protection/cover board, vapor retarder, membrane flashing and stripping, and other accessory materials.
- B. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Division 07 Section "Sheet Metal Flashing and Trim" for metal flashings, counterflashings, downspouts, and trim.
 - 3. Division 07 Section "Roof Accessories" for roof hatches, equipment and pipe supports.
 - 4. Division 07 Section "Joint Sealants" for sealants, joint fillers, and joint preparation.
- C. Roofing Filled Sub-Bid Contractor shall provide wood blocking associated with roofing where indicated on the Drawings.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.4 PREINSTALLATION MEETING

- A. Pre-Installation Roofing Conference: Before start of roof Work, conduct conference at Project site. Notify participants at least five (5) business days prior to the meeting.
 - 1. Meet with Owner, Architect, Owner's Project Manager, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review deck substrate conditions and finishes, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review the requirements for performing pull tests on the existing deck.

7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
8. Review governing regulations and requirements for insurance and certificates.
9. Review temporary protection requirements for roof system during and after installation.
10. Review roof observation and repair procedures after roofing installation.
11. Document proceedings, including any corrective measures or actions required, and furnish copy of record to each participant.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's printed data for each type of product.
 1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav [SPRI's Directory of Roof Assemblies] listing.
 2. For membrane, documentation indicating material meets Solar Reflectance Index requirements.
 3. For adhesives and sealants, documentation indicating VOC content.
 4. For roof insulation, documentation indicating the thermal performance of the products, the average thickness of roof insulation provided, and the total R-value achieved.
- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
 1. Layout and thickness of insulation.
 2. Base flashings and membrane terminations.
 3. Flashing details at penetrations.
 4. Tapered insulation thickness and slopes.
 5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
 6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 7. Tie-in with air/water barrier.
 8. Vapor barrier.
- C. Samples for Verification: For the following products:
 1. Membrane Roofing and Walkway Pads: 12 by 12-inches square; of each color required.
 2. Roof Insulation: 12 by 12-inches square.
 3. Insulation Fasteners: One of each type, length and finish.
- D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.
- E. Qualification Data: For Installer and manufacturer.
- F. Manufacturer Certificates:
 1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a) Submit evidence of compliance with performance requirements.
 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

- G. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install specified roofing system.
 - 1. Certification shall have been issued by the manufacturer no less than one (1) year prior to the date of the Contractor's Bid Proposal.
- H. Product Test Reports: For roof membrane and insulation, tests performed by independent qualified testing agency indicating compliance with specified requirements.
- I. Evaluation Reports: For components of roofing system, from ICC-ES.
- J. Field Quality Control Reports: Copy of roofing system manufacturer's periodic and final field inspection reports of roofing installation.
- K. Warranties: For manufacturer's standard and special warranties, and Installer's warranty.
- L. Maintenance Data: For roofing system to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: A qualified manufacturer that is listed in FM Global Approvals' Roof Nav [listed in SPRI's Directory of Roof Assemblies] for roofing system identical to that used for this Project.
 - 2. Installer: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty. Provide copy of certification for Architect prior to awarding roofing work. Such certification shall have been issued by the manufacturer no less than one (1) year prior to the date of the Contractor's Bid Proposal.
 - a. The roofing contractor shall be doing business under the same name a minimum of ten (10) years prior to date of Bid.
- B. Installer's Field Supervision: Maintain a full-time supervisor/foreman who is on job site during times that roofing work is in progress and who is experienced in installing roofing systems similar to type and scope required for this Project. The supervisor/foreman shall be certified by the manufacturer as an approved applicator of the roofing system.

1.7 MOCKUPS

- A. Mockups: Build to set quality standards for materials and execution.
 - 1. Before beginning installation of roofing, build minimum 4'-0" long by full-size mockup of new to existing roof membrane transition at base of rising wall (Detail 14/A501).
 - a. Include transitions to existing membrane at base of wall and field membrane assembly at pavilion roof.
 - 2. Mock-ups may be constructed in-place or as stand-alone units which incorporate roofing membrane; protection board, insulation, vapor barrier; flashings, including term bars; heat welds, and counterflashings. Stand-alone units must include backup wall construction, external cladding, insulation, and flashing to demonstrate complete installation.
 - 3. Coordinate mockup locations and review with OPM, Architect, and Owner.
 - 4. If Architect determines mockups do not comply with requirements, reconstruct until approved. Approval of mockups does not constitute approval of deviations from the

Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Comply with manufacturer's written instructions for proper material handling and storage.
- C. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 1. Discard and legally dispose of materials that cannot be applied within its stated shelf life.
- D. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- E. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

- A. Protect building areas shown to be roofed, adjacent walkways, site improvements, exterior plantings and landscaping from damage or soiling from roofing operations.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- C. Under no circumstances shall the existing adjacent buildings' occupants be subjected to fumes or other deleterious effects of the operation. Should the schedule or conditions produce this condition, the Contractor shall be required to suspend operations that produce the offending effects until such time as the building is not occupied, or as approved by the Owner.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover/protection boards, roof edge, roof accessories, and other components of roofing system. Provide an "Edge-to-Edge Warranty."
 2. Warranty Period: Twenty (20) years from date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base

flashing, roof insulation, fasteners, cover/protection boards, vapor retarders, and walkway products, for the following warranty period:

1. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.
 1. Accelerated Weathering: Roofing system shall withstand 2,000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D3746 or ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Roofing System Design: Design roofing system and test by a qualified testing agency to resist the uplift pressures as indicated on the Structural Drawings and as follows:
 1. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and are listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.
 2. Additional Requirements: Roofs must be able to withstand wind uplift loads as calculated in accordance with ASCE 7 "Minimum Design Loads for Buildings and Other Structures" and State Building Code in which the project is located.
 - a) Metal edge flashing, coping, or parapet design should be completed in accordance with ANSI/SPRI ES-1 "Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems" or FMDS 1-49 "Perimeter Flashing."
- D. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 64 or initial SRI not less than 82 when calculated according to ASTM E1980, based on testing identical products by a qualified testing agency.
- E. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- F. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 SOURCE LIMITATIONS

- A. Source Limitations: Obtain components, for roofing system (roof membrane, roof insulation, coated metal flashing suitable for heat welding membrane, and fasteners) from roof membrane manufacturer or manufacturers approved in writing by roof membrane manufacturer.

2.3 POLYVINYL-CHLORIDE (PVC) ROOFING

- A. PVC Sheet: Type III, ASTM D4434/D4434M, fabric reinforced.
1. Basis-of-Design Product: "Sarnafil Adhered System" by Sika Roofing and Waterproofing.
 2. Alternate Products: Subject to compliance with requirements, provide a comparable product by one of the following manufacturers:
 - a. "PVC Sure-Flex Roof" by Carlisle Syntec Systems.
 - b. "Elevate PVC Roof" by Elevate; Holcim Building Envelope.
 - c. "JM PVC SD Plus Roof" by Johns Manville; a Berkshire Hathaway company
 3. Thickness: 80 mils, nominal.
 4. Exposed Face Colors: To be selected by Architect from standard range.

2.4 ACCESSORY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
1. Liquid-type materials shall comply with VOC limits of authorities having jurisdiction.
 2. Adhesives and sealants shall comply with the following limits for VOC content:
 - a. Plastic Foam Adhesives, Gypsum Board, and Panel Adhesives: 50 g/L.
 - b. Multipurpose Construction Adhesives: 70 g/L.
 - c. Fiberglass and Contact Adhesives: 80 g/L.
 - d. Single-Ply Roof Membrane Adhesives: 450 g/L.
 - e. PVC Welding Compounds: 510 g/L.
 - f. Other Adhesives and Sealants: 250 g/L.
 - g. Single-Ply Roof Membrane Sealants: 450 g/L.
 - h. Non-Membrane Roof Sealants: 300 g/L.
 - i. Sealant Primers for Nonporous Substrates: 250 g/L.
 - j. Sealant Primers for Porous Substrates: 775 g/L.
 3. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.
1. Provide metal furnished by roofing manufacturer, suitable for field weld of membrane to metal, at all low-slope roof areas as detailed on the Drawings with interfacing sheet metal flashing or trim.
- C. Bonding Adhesive: Manufacturer's standard.
- D. Slip Sheet: Manufacturer's standard, of thickness required for application.

- E. Metal Termination Bars: Manufacturer's standard, pre-drilled stainless-steel bars, approximately 1 by 1/8- inch thick; with anchors.
- F. PVC Roofing Manufacturer's Standard Expansion Joint: Formed with PVC sheet, flashing, hot-air welded flashing strip, compatible foam rod tubing, and mineral wool batt insulation.
- G. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer. Sized to provide 8-inches minimum of vertical height between finish roof surface and clamp.
- H. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- I. Metal Flashings and Copings; Provide metal furnished by roofing manufacturer, suitable for field weld of membrane to metal, at low-slope roof areas with sheet metal flashing or trim.
- J. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, cover strips, cants, and other accessories.

2.5 VAPOR RETARDER

- A. Laminated Sheet: Two-layer, fire-retardant polyethylene laminate, reinforced with cord grid.
 - 1. Basis of Design Product: "Sarnavap-10" by Sika/Sarnafil.
 - a. Thickness: 10 mils.
 - b. Permeance Rating: Not more than 0.062 perms when tested in accordance with ASTM E96/E96M.
 - c. Flame-Spread Index: Not more than 5 when tested in accordance with ASTM E84.
 - d. Smoke-Developed Index: Not more than 35 when tested in accordance with ASTM E84.
 - e. Tape: Pressure-sensitive tape of type recommended by vapor retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.6 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by PVC roof membrane manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated, and approved for use in FM Approvals' RoofNav listed roof assemblies.
 - 1. Provide staggered joints where installed in multiple layers
 - 2. Tapered insulation, where indicated, shall be installed on top.
 - a. Tapered layer shall slope as indicated on Drawings.
 - 3. R-Value: Minimum R-30, continuous insulation (CI).
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber-mat facer on both surfaces.
 - 1. Compressive Strength: 20 psi.
 - 2. Size: 48-inches by 96-inches.
 - 3. Base Layer Thickness: 1 1/2-inches.
 - 4. Upper Layer: As required to meet R-value and roof design.

- C. Tapered Insulation: Provide factory-tapered insulation boards.
 - 1. Material: Match roof insulation.
 - 2. Minimum Thickness: 1/4-inch.
 - 3. Slope: Provide the following unless otherwise indicated on Drawings.
 - a. Roof Field: Minimum slope of 1/4-inch per 12-inches (1:48) slope.
 - b. Saddles, Crickets, and Countertapers: Minimum slope of 1/2-inch per 12-inches.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain.

2.7 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover/protection boards to substrate, and acceptable to roofing system manufacturer.
- C. Glass-Mat Gypsum Protection/Cover Board: ASTM C1177/C1177M, water-resistant gypsum board, factory primed. Provide 1/4-inch-thick material unless otherwise indicated on Drawings.
 - 1. Basis of Design Product: "Dens Deck Prime" by Georgia-Pacific Gypsum LLC
 - 2. Alternate Acceptable Products: Subject to compliance with requirements, provide one of the following:
 - a. "GlasRoc Sheathing" by CertainTeed; Saint-Gobain.
 - b. "Gold Bond eXP Extended Exposure Sheathing" by National Gypsum Co.
 - c. "Securock Glass Mat Roof Board" by USG Corporation.

2.8 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16-inch thick by 36-inches wide, and acceptable to roofing system manufacturer.
 - 1. Provide between all roof access points and roof top equipment, at top and bottom of all roof ladders, and in locations as shown on the Drawings.
 - 2. Color to be contrasting with roof membrane color.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
 - 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

3. Verify that surface plane flatness and fastening of roof deck complies with requirements in Division 05 Section "Steel Deck" and with roofing manufacturer's requirements.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
 1. Submit test result within 24 hours of performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav, SPRI's Directory of Roof Assemblies listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Review and inspect all roof drainage systems. Test for clogs and back-ups in system and flush completely clean with water. Insure that when roofing work is complete all drainage is functioning properly.
- D. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Division 07 Section "Self-Adhering Sheet Air Barriers."

3.4 INSTALLATION OF VAPOR RETARDER

- A. Laminate Sheet: Loosely lay laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2-inches and 6-inches, respectively.
 1. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
 2. Continuously seal side and end laps with tape.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.
- C. Extend vapor barrier to seal to air/water barrier at walls.

3.5 INSTALLATION OF INSULATION

A. General:

1. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.
2. Comply with roofing system and insulation manufacturer's written instructions for mechanically fastening and installing roof insulation.
3. Install tapered insulation under area of roofing to conform to slopes indicated.
4. Install insulation under area of roofing to achieve required thickness.

B. Mechanically Fastened Insulation:

1. Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
2. Fasten insulation according to requirements in SPRI's Directory of Roof Assemblies for specified Wind Uplift Load Capacity.
3. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
4. Install base layer of insulation with joints staggered not less than 24-inches in adjacent rows, end joints staggered not less than 12-inches in adjacent rows.
5. At metal decking, Install with long joints continuous at right angle to flutes of metal decking. Locate end joints over crests of metal decking.
6. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12-inches from previous layer of insulation.
 - a. Staggered end joints within each layer not less than 24-inches in adjacent rows.
 - b. Install with long joints continuous and with end joints staggered not less than 12-inches in adjacent rows.
 - c. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - d. Make joints between adjacent insulation boards not more than 1/4-inch in width.
 - e. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24-inches, unless otherwise indicated.
 - 1) Trim insulation so that water flow is unrestricted.
7. Cut and fit insulation within 1/4-inch of nailers, projections, and penetrations.
8. Fill gaps exceeding 1/4-inch with insulation.

3.6 INSTALLATION OF COVER/PROTECTION BOARDS

A. Install cover/protection boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6-inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.
 - a. Trim cover board so that water flow is unrestricted.
3. Cut and fit cover board tight to nailers, projections, and penetrations.
4. Mechanically fasten cover boards according to requirements in SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity.
 - a. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
5. Adhere cover board to substrate using adhesive according to SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity as

follows:

- a. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

3.7 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane according to roofing system manufacturer's written instructions.
- B. Unroll roofing and allow to relax before retaining.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- D. Accurately align roof membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- F. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- G. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- H. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.
 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- I. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.8 INSTALLATION OF BASE FLASHING

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

3.9 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.
 - 1. Provide 6-inch clearance between adjoining pads.

3.10 FIELD QUALITY CONTROL

- A. Progress Roof Inspections: Roofing Contractor shall engage the roofing manufacturer to provide technical personnel to inspect substrate conditions, surface preparation, membrane application, flashings, protection and drainage components, and to furnish reports to Architect. Provide bi-weekly inspections during roof installation work and prepare written inspection reports.
- B. Flood Testing: Roofing Contractor shall arrange for an independent testing agency or the roofing manufacturer to perform a flood test of each roofing area according to recommendations in ASTM D5957 to test for leaks. Conduct after completing roofing and flashing, but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - 1. Flood to an average depth of 2-inches with a minimum depth of 1-inch and not exceeding a depth of 3-inches. Maintain 2-inches clear from top of base flashing.
 - 2. Flood each area for 48 hours.
 - 3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.
 - 4. Cost of retesting is Contractor's responsibility.
 - 5. Testing agency shall prepare survey report indicating locations of initial leaks, if any, and final survey report.
- C. Testing Agency: Owner may engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect. Testing agent may also utilize one of the following test methods to test for leaks:
 - 1. Infrared Thermography: Testing agency surveys entire roof area using infrared color thermography according to ASTM C1153.
 - a. Perform tests before overlying construction is placed.
 - b. After infrared scan, locate specific areas of leaks by electrical capacitance/impedance testing or nuclear hydrogen detection tests.
 - c. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.
 - 1) Cost of retesting is Contractor's responsibility.
 - d. Testing agency to prepare survey report of initial scan indicating locations of entrapped moisture, if any.
 - 2. Low-Voltage ELD Testing: Testing agency surveys entire roof area and flashings to locate discontinuities in the roof membrane using low-voltage membrane electric field vector mapping in accordance with ASTM D8231.
 - a. Perform tests before overlying construction is placed.
 - b. After testing, repair areas of discontinuities, repeat tests, and make further repairs until roofing and flashing installations are contiguous.
 - 1) Cost of retesting is Contractor's responsibility.

- c. Testing agency to prepare survey report indicating locations of initial discontinuities, if any.
- D. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, and to prepare written inspection report.
- E. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.11 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Remove all debris from completed roof areas.
- C. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- D. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.12 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, here-in called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: City of Providence.
 - 2. Owner Address: 25 Dorrance Street, Providence, RI 02903.
 - 3. Building Name/Type: Providence City Hall.
 - 4. Building Address: 25 Dorrance Street, Providence, RI 02903.
 - 5. Area of Work: Low-slope pavilion roofs.
 - 6. Acceptance Date: _____.
 - 7. Warranty Period: Two (2) Years.
 - 8. Expiration Date: _____.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding 110 mph;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 075419

SECTION 075600 - FLUID-APPLIED ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes reinforced fluid-applied roofing system.
- B. Related Requirements:
 - 1. Division 05 Section "Historic Cast Iron Repair."
 - 2. Division 06 Section "Rough Carpentry."
 - 3. Division 07 Section "Fluid-Applied Air Barriers."
 - 4. Division 07 Section "Cold Fluid-Applied Waterproofing."
 - 5. Division 07 Section "Joint Sealants."

1.3 COORDINATION

- A. Coordinate Work under this Section with adjacent roofing and waterproofing work, including slate roofing, single-ply membrane roofing, and fluid-applied waterproofing.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review roofing requirements including, but not limited to, the following:
 - a. Surface preparation specified in other Sections.
 - b. Minimum curing period.
 - c. Forecasted weather conditions.
 - d. Special details and sheet flashings.
 - e. Repairs.
 - f. Field quality control.

1.5 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and tested physical and performance properties of roofing system.
 - 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrates.
- B. Shop Drawings:
 - 1. Show locations and extent of roofing.

2. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing and roofing systems, and other termination conditions.

C. Samples:

1. Cured sample of reinforced roofing membrane on suitable rigid substrate, 8 by 8 inches.

D. Qualification Data: For Installer.

E. Field quality-control reports.

1. Watertightness integrity test results.

F. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum of 20 years of experience in the production and sales of roofing.

1. Roofing manufacturer shall have available an in-house technical staff to assist the contractor when necessary in the application of the products and site review of the assembly.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by roofing manufacturer.

C. Mock-ups

1. Build mockups to verify selections made under Sample submittals and to set quality standards for installation.
 - a. Build mockup for each typical roofing installation and each type of transition to adjacent systems, including accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.
 - b. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Install roofing within the range of ambient and substrate temperatures recommended in writing by roofing manufacturer.

1. Do not apply roofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.
2. Do not apply roofing in snow, rain, fog, or mist, or when such weather conditions are imminent during application and curing period.

B. Maintain adequate ventilation during application and curing of roofing materials.

1.8 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace roofing that fails in materials or workmanship within specified warranty period.

1. Warranty Period: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations:

1. Fluid-Applied Waterproofing System, Fluid-Applied Air Barrier, and Fluid-Applied Roofing System: Obtain materials and accessories for all fluid-applied waterproofing, air barrier, and fluid-applied roofing systems from single source from single manufacturer.

B. Manufacturers:

1. Basis-of-Design Manufacturer:
 - a. Henry, a Carlisle Company.
2. Alternate Manufacturers: Subject to compliance with specifications and evaluation by Architect and Owner, provide approved equivalent waterproofing and roofing systems from alternate single-source manufacturer, including but not limited to the following. Refer to source limitations above.
 - a. Sika Corporation.
 - b. Soprema USA.

2.2 REINFORCED FLUID-APPLIED ROOFING SYSTEM

A. Fluid-Applied Roofing: Single component, cold, fluid applied, polyurethane, polyurethane-hybrid, or PMMA reinforced roof coating in accordance with ASTM C836.

1. 100 percent solids roofing membrane, having the following typical properties:
 - a. Rain ready within 1 hour
 - b. Foot traffic ready within 1 hour
 - c. UV Resistance: Permanent UV exposure
 - d. Crack bridging (ASTM C1305): Pass
 - e. Complies with ASTM C836
 - f. Tensile Strength: 425 psi minimum; ASTM D638.
 - g. Elongation at Break: 250 percent minimum; ASTM D638.
2. Basis of Design:
 - a. Pumadeq System by Henry.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials recommended in writing by roofing manufacturer for intended use and compatible with one another and with roofing.

1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Manufacturer's standard primer, sealer, or surface conditioner; factory formulated as recommended in writing for substrate by roofing manufacturer.

C. Sheet Flashing: Manufacturer's standard flashing sheet.

1. Adhesive: Manufacturer's recommended contact adhesive.

- D. Membrane-Reinforcing Fabric: Manufacturer's recommended fiberglass mesh or polyester fabric, manufacturer's standard weight.
- E. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.
- F. Joint Sealant: Multicomponent polyurethane sealant, compatible with roofing; ASTM C920, Type M, Class 25 or greater; Grade NS for sloping and vertical applications and Grade P for deck applications; Use NT exposure; and as recommended by manufacturer for substrate and joint conditions.
 - 1. Backer Rod: Closed-cell polyethylene foam.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that concrete has cured and aged for minimum time period recommended in writing by roofing manufacturer.
 - 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.
 - 3. Verify surfaces are sound, clean, dry, and free of oil, grease, dirt, excess mortar, frost, laitance, loose and flaking particles, or other contaminants.
 - 4. Verify substrates are continuous and secure, smooth and without large voids, spalled areas, or sharp protrusions.
 - 5. Verify cold joints are on the same plane.
 - 6. Verify penetrations are in place, including coping, railings, flashing, electrical conduit, pipes, pedestals, and curbs.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for roofing application.
 - 1. Metal Surfaces:
 - a. Mechanically abrade metal surfaces to meet SSPC-SP3 to remove corrosion deposits back to a clean, bright metal followed by a solvent wipe prior to application of the specified primer.
 - b. Clean metal, remove debris and sharp edges, and immediately prime substrate to avoid flash rusting.
- B. Verify that the deck is clean and smooth, free of depressions, waves, or projections, and properly sloped to drains, valleys, eaves, scuppers or gutters. Verify that all roof openings or penetrations through the roof are secured back to solid blocking. Ensure all preparatory work is complete prior to applying membrane.
- C. Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing and fastened into solid backing .

- D. All surfaces shall be blown clean using an air compressor to remove any remaining loose debris.
- E. Mask off adjoining surfaces not receiving roofing to prevent spillage and overspray affecting other construction.
- F. Close off adjacent drains to prevent spillage and migration of roofing fluids.
- G. Prepare substrates 2 inches (50 millimeters) minimum beyond area of anticipated roofing.
- H. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from surfaces.
- I. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.

3.3 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS

- A. Prepare surfaces at terminations and penetrations through roofing and at expansion joints, drains, sleeves, and corners according to roofing manufacturer's written instructions and to recommendations in ASTM C898/C898M and ASTM C1471.
- B. At all inside corners, gaps or voids at the juncture of the deck and penetrations apply a minimum 3/4 inch fillet bead of Polyurethane sealant and allow to cure per roofing membrane manufacturer's technical data sheets prior to installing the roofing membrane system.
- C. Membrane terminations shall be established prior to project start-up and documented in shop drawings. Terminations shall occur in raked-out mortar joints, saw cut terminations or under installed counter-flashing materials.
- D. Use tape lines to achieve a straight edge detail.

3.4 JOINT AND CRACK TREATMENT

- A. Prepare, treat, rout, and fill joints and cracks in substrate according to roofing manufacturer's written instructions and to recommendations in ASTM C898 and ASTM C1471. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D4258.
 - 1. Comply with ASTM C1193 for joint-sealant installation.
 - 2. Apply bond breaker on sealant surface, beneath preparation strip.
 - 3. Prime substrate along each side of joint and apply a single thickness of preparation strip at least 6-inches wide along each side of joint. Apply roofing in two separate applications and embed a joint reinforcing strip in the first preparation coat.
- B. All cracks and voids greater than 0.040 inches shall be routed and caulked with a Polyurethane sealant. Allow to cure per roofing membrane manufacturer's technical data sheets prior to over-coating with the specified roofing membrane system
- C. At all moving cracks, moving joints between dissimilar materials, and similar conditions, create a minimum 1 inch wide bond break utilizing bond breaker tape, centered over the crack or joint.
- D. Install sheet flashing where required according to roofing manufacturer's written instructions.

1. Extend sheet flashings for 4-inches onto perpendicular surfaces and items penetrating substrate.

3.5 INSTALLATION OF ROOFING

- A. Apply roofing according to manufacturer's written instructions and to recommendations in ASTM C898 and ASTM C1471.
- B. Start installing roofing in presence of manufacturer's technical representative.
- C. Apply primer over prepared substrate unless otherwise instructed in writing by roofing manufacturer.
 1. Mix and apply specified primer for specified surfaces by brush or roller at the application rate shown on the technical data sheet. Porous, rough or absorbent surfaces will decrease coverage rates.
 2. Allow to cure and dry in accordance with manufacturer's technical data sheets.
- D. Install roofing membrane at minimum thickness required by manufacturer to form a continuous monolithic membrane over horizontal and vertical surfaces.
 1. Do not install roofing beyond cured primer.
- E. Cure roofing, taking care to prevent contamination and damage during application and curing.

3.6 MEMBRANE REINFORCEMENT

- A. Reinforcement of Cracks, Metal Joints and Base/Curb Flashing Transitions:
 1. For all locations where the specified coating system is to be applied directly to the substrate surface, provide reinforcement of cracks and joints prior to applying the specified coating system.
 2. For all horizontal-to-vertical transitions, provide a $\frac{3}{4}$ " x $\frac{3}{4}$ " polyurethane sealant cant.
 3. Apply a minimum of a 3 inch wide strip of membrane reinforcement into a bed of liquid roof coating. Back roll reinforcement to fully embed reinforcement into the wet liquid membrane. Add more liquid membrane as needed to fully embed the reinforcement.
 4. Ensure reinforcement is not in tension during embedment.

3.7 FLUID-APPLIED FIELD COATING APPLICATION

1. Prior to coating any surface, be sure the coating will adhere by performing an adhesion test (ASTM D-903). Coating may be applied by brush, roller, or airless spray equipment. Do not apply when temperatures are below 41 °F (5 °C) or when precipitation is in the forecast within 24 hours. In areas where the roof is subject to foot traffic, it is recommended to apply walkway pads for added protection and slip resistance. Apply Primer to the substrate according to the application instruction from the Primer PDS, and allow to dry.
2. Start with flashing details at round projections, machine legs, sign posts, guide wire straps, inside and outside, corners, gutters, parapet walls, penetrations and similar areas should be flashed. Repair any damaged metal and caulk and seal watertight all screws,

seams, transitions, terminations, penetrations, skylights, joints, pipes, voids, protrusions and any area where water could enter through the roof.

Apply field membrane at manufacturer's required rate and cured thickness for specified warranty.

3. Protection: After completion of application, do not allow traffic on coated surfaces for a period of at least 48 hours at 75° F and 50% R.H., or until completely cured.

3.8 PARAPET AND WALL FLASHINGS

- A. Clean, prepare and prime flashing substrate surfaces ready to receive membrane flashing applications.
- B. All parapet, wall, and curb flashings shall be provided with a sealant cant with reinforcement prior to flashing application.
- C. Terminate roofing membrane system at raked-out mortar joints, termination saw cut joint, or under installed counter-flashing materials. Seal all mortar joints and saw cut joints with polyurethane sealant.
- D. Install metal counter flashings in accordance with details.

3.9 DRIP EDGES AND OTHER METAL FLANGED FLASHING

- A. Clean, prepare and prime metal flange surfaces ready to receive membrane flashing applications.
- B. Metal flanges are typically encapsulated between two membrane layers, usually by providing membrane flashing as a stripping ply over the metal flange, with the field or flashing membrane extending beneath the metal flange. It is also acceptable to install the stripping ply under the metal flange and extend the field or flashing membrane over the metal flange.

3.10 ROOF DRAINS

- A. Clean, prepare and prime surfaces ready to receive membrane applications. Block drain bowl opening to avoid roofing material from entering the drainage system.
- B. Remove strainer baskets and clamping rings from the drain bowl assembly. Temporarily replace the bolts back into assembly to avoid miss-alignment of connections after membrane applications are completed.
- C. Extend the liquid coating material and membrane reinforcement directly into the throat of the prepared drain.
- D. Remove drain blocks and allow the roofing system to fully cure dry prior to re-connecting the drain bowl assembly.

3.11 ROOF PENETRATIONS

- A. Clean, prepare and prime surfaces ready to receive membrane flashing applications. Ensure that penetrations are secured to prevent movement.
- B. Apply reinforced membrane around all roof penetrations according to manufacturer's requirements.

3.12 APPLICATION OF PENETRATION SEALANT

- A. Seal reglet-based membrane terminations, heads of exposed mechanical fasteners, around penetrations, duct work, electrical and other apparatus extending through the roofing membrane with specified penetration sealant.

3.13 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage roofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components and to furnish reports to Architect.
 - 1. Refer to roofing Manufacturer for warranty requirements.
 - 2. Observe roofing installation during the following phases, minimum:
 - a. Substrate verification.
 - b. Roofing membrane installation start.
 - c. Final inspection of roofing assembly.
- B. Roofing will be considered defective if it does not pass tests and inspections.

3.14 PROTECTION

- A. Protect roofing from damage and wear during remainder of construction period.
 - 1. Stage materials in such a manner that avoids foot traffic over completed roof areas.
 - 2. Provide temporary walkways and platforms to protect completed Work from traffic and point loading during the application process.
- B. Provide temporary membrane tie-ins and water-stops at the end of each workday and remove prior to commencement of Work the following day.
- C. Correct deficiencies in or remove roofing that does not comply with requirements; repair substrates, reapply roofing, and repair sheet flashings.

END OF SECTION 075600

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:

- 1. Metal fabrications and flashing at exterior masonry and roofing, including but not limited to:
 - a. Base flashings and counterflashings.
 - b. Edge flashing and drip edges.
 - c. Flashing receivers.
 - d. Aprons and crickets.
 - e. Ridge, hip, and valley flashings at slate roofs.
 - f. Built-in gutter lining.
 - g. New downspouts.
 - h. Scuppers and conductors
- 2. Underlayment, sealants and mastics, fasteners, solder, and other accessories.

- B. Related Requirements:

- 1. Division 05 Section "Historic Decorative Metal Replication" for copper cladding that is not detailed as integrated roof flashing.
- 2. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
- 3. Division 07 Section "Slate Shingles" for installing flashings and roof drainage systems in conjunction with slate shingle roofs.
- 4. Division 07 Section "PVC Roofing" installation of sheet metal flashing and trim integral with membrane roofing.
- 5. Division 07 Section "Fluid-Applied Roofing and Flashing" for fluid-applied roofing.
- 6. Division 07 Section "Roof Accessories" for curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
- 7. Division 07 Section "Joint Sealants" for sealant used in conjunction with flashing and trim.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to sheet metal flashing and trim.
 - 2. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
 - 4. Review requirements for insurance and certificates if applicable.
 - 5. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
 - 2. For products having recycled content, documentation indicating postconsumer and pre-consumer recycled content and cost.
- B. Shop Drawings: For sheet metal flashing and trim.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
 - 3. Include material, thickness, weight, and finish for each item and location in Project.
 - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
 - 5. Include details for joining, supporting, and securing, including layout, and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - 6. Include details of termination points and assemblies.
 - 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
 - 8. Include details of roof-penetration flashing.
 - 9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
 - 10. Include details of special conditions.
 - 11. Include details of connections to adjoining work.
 - 12. Detail formed flashing and trim at scale of not less than 3-inches per 12-inches.
- C. Samples for Verification: For each type of exposed product and for each finish specified.
 - 1. Size: Full size, 12-inches long and in required profile.
- D. Qualification Data: For fabricator.
- E. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved.
- F. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- G. Evaluation Reports: For copings and roof edge flashing, from ICC-ES showing compliance with ANSI/SPRI/FM 4435/ES-1.

- H. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
- I. Warranty: Sample of standard and special warranties.

1.6 QUALITY ASSURANCE

- A. Fabricator and Installer Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance. Refer to Division 01 Section "Quality Requirements" for additional requirements.
 - 1. Work must be performed by a firm having not less than ten (10) years of experience.
 - 2. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested shop shall be listed as able to fabricate required details as tested and approved.
- B. Mockups: Build mockups to verify selections made under Sample submittals, and to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockups of all typical roof edge and transition conditions, including gutters, fascias, and flashings, approximately 5-feet long, including supporting construction, cleats, seams, attachments, flashings, underlayment, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves in writing.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Fire Prevention: Field soldering shall be carried out in accordance with requirements of Authorities Having Jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
 - 1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 - 2. Protect stored sheet metal flashing and trim from contact with water.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.8 WARRANTY

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

2. Finish Warranty Period: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standards for Flashing and Trim:
 1. Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
 2. Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
 1. Design Pressure: As indicated on Structural Drawings.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. Source Limitations: Obtain each type of sheet from a single source and from a single manufacturer.
- B. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- C. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- D. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 or H01 temper; with non-patinated exposed mill finish.

1. Acceptable Manufacturers:
 - a. Aurubis Buffalo, Inc.
 - b. Hussey Copper, Ltd.
 - c. Revere Copper Products, Inc.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Waterproofing Membrane: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Grace Ultra by GCP Applied Technologies (CertainTeed Saint-Gobain)
 - b. WIP 300HT by Carlisle WIP Products; a brand of Carlisle Construction Materials.
 - c. Grace Ice and Water Shield HT by GCP Applied Technologies Inc.
 - d. Blueskin PE200 HT by Henry Company.
 2. Source Limitations: Obtain underlayment from single source from single manufacturer.
 3. Low-Temperature Flexibility: ASTM D1970; passes after testing at -20 deg F or lower.
- B. Slip Sheet: Rosin-sized building paper, 5 lbs./100 sq. ft. minimum.

2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item. Fasteners shall not damage underlying or adjacent construction.
 1. General: Blind fasteners or and concealed to the greatest extent possible.
 - a. Blind Fasteners: High-strength stainless-steel rivets suitable for metal being fastened.
 - b. Provide Exposed Fasteners only where necessary: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 2. Fasteners for Copper: Copper or hardware bronze.
 3. Fasteners for Aluminum: Series 300 stainless steel.
 4. Gutter Brackets: Same material as gutter.
- C. Metal Accessories: Sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.
- D. Solder: ASTM B32, 100 percent tin, with maximum lead content of 0.2 percent, as recommended by sheet metal manufacturer.

- E. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.
- I. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

2.5 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
 - 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 3. Fabricate units that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 4. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
 - 5. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 6. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with permanent separation as recommended by manufacturer and with material that will not stain exposed face materials.
- C. Fabrication Tolerances:
 - 1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4-inch in 20-feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10-feet with no joints allowed within 24-inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with sealant (concealed within joints).
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.

- E. Sealant Joints: Where detailed and where movable, non-expansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal.
 - 1. Sizes shall be as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- G. Seams: Fabricate nonmoving seams with flat-lock seams.
 - 1. Copper: Tin edges to be seamed, form seams, and solder.
 - 2. Aluminum: Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- H. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Built-In Gutters/Troughs:
 - 1. Style and Size: As detailed on the Drawings.
 - 2. Re-establish built-in gutters/troughs and cornice to match the existing.
 - 3. Provide new kiln dried Douglas-fir wood blocking, formwork and supports, gutter hangers, underlayment, and accessories.
 - 4. New gutter components shall match the size, shape, profiles, and details of the existing; verify characteristics in the field.
 - 5. Materials:
 - a. Gutters/Troughs with Girth up to 25-Inches: 20 oz./sq. ft. copper.
 - b. Gutters/Troughs with Girth 26-inches to 30-Inches: 24 oz./sq. ft. copper.
- B. Conductors: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim.
 - 1. Copper Gutters: 3-inch diameter. Fabricate from 16 oz./ sq. ft. copper.
 - a. Provide bronze or copper wire ball strainers at each conductor.
- C. Downspouts: Fabricate rectangular downspouts; complete with mitered elbows. Furnish with flat metal hangers, from same material as downspouts and anchors. Downspout size shall be in dimensions as indicated on the Drawings.
 - 1. Copper Gutters: 16 oz./ sq. ft. copper; 3 by 5-inch rectangular.
- D. Splash Pans at Roof: Fabricate 8 by 18-inch rectangular sloped splash pans at each downspout which discharges onto an adjacent roof. Fabricate from same material as downspouts.
 - 1. Copper Gutters: 16 oz./ sq. ft. copper.
- E. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 4-inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:
 - 1. Copper: 16 oz./sq. ft.

2.7 SHEET METAL FABRICATIONS

- A. General: Provide the materials listed below unless otherwise indicated on the Drawings.
 - 1. Miter and solder corners and junctions in copper.
 - 2. Shop fabricate interior and exterior corners.
- B. Flashing:
 - 1. Copper: 20 oz./ sq. ft., unless otherwise noted.
- C. Counterflashing and Flashing Receivers:
 - 1. Copper: 16 oz./ sq. ft., unless otherwise noted.
- D. Reglets: Form to provide secure interlocking of reglet and separate counterflashing pieces. Miter and solder corners and junctions. Provide with offset top flange for embedment in masonry mortar joint where located in masonry walls.
 - 1. Copper: 16 oz./ sq. ft., unless otherwise noted.
- E. Apron, Step, Cricket, and Backer Flashing:
 - 1. Copper: 20 oz./ sq. ft., unless otherwise noted.
- F. Roof Penetration Flashing:
 - 1. Copper: 16 oz./ sq. ft., unless otherwise noted.
- G. Drip Edges:
 - 1. Copper: 16 oz./ sq. ft., unless otherwise noted.
- H. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4-inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams.
 - 1. Copper: 16 oz./ sq. ft., unless otherwise noted.

2.8 CUSTOM HISTORIC SHEET METAL FABRICATIONS

- A. Replicate existing sheet metal flashing, trim, and decorative elements on the Historic Building to match the original detailing. Install all new miscellaneous wood blocking and clad with copper at both exterior and interior sides or as exists. Refer to Drawings and Division 05 Section "Historic Decorative Metal Replication" for additional information.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

3. Verify that underlayments have been installed over roof sheathing or backing substrate to prevent air infiltration and water penetration.
4. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
5. Report all defects to the Architect immediately upon determination.
6. Commencement of the work in this Section shall be construed as acceptance of the surfaces and conditions as suitable.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering, High-Temperature Waterproofing Membrane:

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

- B. Install slip sheet, wrinkle free, directly on substrate before installing sheet metal flashing and trim.
1. Install in shingle fashion to shed water.
 2. Lap joints not less than 4-inches.

3.3 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes.
3. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant where required.
4. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
5. Exposed edges shall be folded back to form hems.
6. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
7. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
8. Provide continuous cleats where indicated with fasteners spaced not more than 12-inches on center.
9. Install individual cleats not more than 12-inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
10. Install sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
11. Do not field cut sheet metal flashing and trim by torch.

12. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 20-feet with no joints within 24-inches of corner or intersection.
 1. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with sealant concealed within joints.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4-inches for nails and not less than 3/4 inch for wood screws. Coordinate with fabricator and installer to achieve maximum pull-out resistance. Do not damage face of adjacent construction.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1-inch into sealant.
 - a. Form joints to completely conceal sealant.
 - b. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way.
 - c. Adjust setting proportionately for installation at higher ambient temperatures.
 - d. Do not install sealant-type joints at temperatures below 40 deg F.
 - e. Prepare joints and apply sealant in accordance with Division 07 Section "Joint Sealants."
 2. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
 - a. Do not use torches for soldering.
 - b. Do not solder aluminum sheet.
 - c. Pre-tinning is not required for zinc-tin alloy-coated copper.
 - d. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 - e. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.
 - f. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 - g. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
- G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 INSTALLATION OF ROOF-DRAINAGE SYSTEM

- A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated on Drawings. Lap joints minimum of 4-inches in direction of water flow.
- C. Conductors: Anchor securely to bottom of gutter with elevation of conductor head rim a minimum of 3-inches below the gutter discharge.
- D. Downspouts:
 - 1. Join sections with 1-1/2-inch telescoping joints.
 - 2. Provide hangers with fasteners designed to hold downspouts securely to walls.
 - 3. Locate hangers at top and bottom and at approximately 60-inches on center.
 - 4. Connect downspouts into cast iron boots leading to underground drainage system, unless otherwise indicated on Drawings.
 - a. Where indicated to discharge to grade, provide elbows and precast concrete splash blocks to direct water away from building.
 - b. Where indicated to discharge onto adjacent low-slope roof areas, provide elbows and splash pans to direct water away from wall.
- E. Splash Pans: Install where downspouts discharge onto low-slope roofs. Set in elastomeric sealant compatible with roofing system membrane.
- F. Splash Blocks: High strength precast concrete splash blocks, 80 lbs. each.
 - 1. Size: 36-inches L. by 3 1/8-inches H. by 12-inches W.
- G. Scuppers: Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips and under roofing membrane.
 - 1. Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
 - 2. Loosely lock front edge of scupper with conductor head.
 - 3. Seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.

3.5 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.
 - 1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
 - 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standards for required windstorm classification.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4-inches over base flashing. Install stainless steel draw band and tighten.

- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
 - 1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
 - 2. Extend counterflashing 4-inches over base flashing.
 - 3. Lap counterflashing joints minimum of 4-inches.
 - 4. Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant anchor and washer spaced at 12-inches on center along perimeter and 6-inches on center at corners areas unless otherwise indicated.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with [elastomeric] [butyl] sealant and clamp flashing to pipes that penetrate roof.

3.6 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Reglets: Saw-cut existing masonry joints in straight and even line to accept the installation of new reglets to receive counterflashing. Protect adjacent surfaces and clean after operations are complete. Refer to Division 04 Section "Historic Masonry Repair."
- C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets and fit tightly to base flashing. Extend counterflashing over base flashing. Lap counterflashing joints minimum of 4-inches. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant, unless otherwise indicated.
- D. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4-inches beyond wall openings.

3.7 INSTALLATION OF MISCELLANEOUS FLASHING

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.8 INSTALLATION TOLERANCES

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

3.9 CLEANING AND PROTECTION

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

- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- D. Upon completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer.
- E. Maintain sheet metal flashing and trim in clean condition during construction.
- F. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes roof hatch at upper dome roof.
- B. Related Requirements:
 - 1. Division 05 Section "Metal Fabrications" for ladders.
 - 2. Division 06 Section "Rough Carpentry" for wood blocking, plywood, cants, and nailers.
 - 3. Division 07 Section "PVC Roofing" for low slope membrane roofing and rigid insulation.
 - 4. Division 07 Section "Sheet Metal Flashing and Trim" for shop and field-formed metal flashing, roof-drainage systems, and miscellaneous sheet metal trim and accessories.

1.3 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 SUBMITTALS

- A. Product Data: For each type of roof accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories.
 - 1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.
- D. Delegated-Design Submittal: For equipment supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system.

2. Wind-Restraint Details: Detail fabrication and attachment of wind restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.
 3. Refer to Division 01 Section "Quality Requirements" for additional requirements regarding delegated design.
- E. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
1. Size and location of roof accessories specified in this Section.
 2. Method of attaching roof accessories to roof or building structure.
 3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
 4. Required clearances.
- F. Sample Warranties: For manufacturer's special warranties.
- G. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Pack, handle, and ship accessories properly labeled in heavy-duty packaging to prevent damage.
- 1.6 WARRANTY
- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 ROOF HATCHES

- A. Roof Hatches: Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing, and weathertight perimeter gasketing, straight sides, and integrally formed deck-mounting flange at perimeter bottom.

1. Basis of Design Products: Provide the basis of design products listed below as manufactured by The Bilco Company.
 - a. "Versamount" by The Bilco Company
 2. Alternate Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Babcock-Davis.
 - b. Milcor; Hart & Cooley, Inc.
- B. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.
- C. Hatch Material: Aluminum sheet.
1. Thickness: Manufacturer's standard thickness for hatch size indicated.
 2. Finish: Baked enamel or powder coat.
 3. Color: As selected by Architect from manufacturer's full range.
- D. Construction:
1. Insulation: 3-inch thick, polyisocyanurate board.
 - a. R-Value: R-20, according to ASTM C1363.
 2. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
 3. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
 4. Provide thermally broken hatch units.
 5. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
 6. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
 7. Fabricate curbs to minimum height of 12-inches above finish roofing surface unless otherwise indicated.
 8. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is tapered to accommodate roof slope so that top surfaces of perimeter curb are level. Equip hatch with water diverter or cricket on side that obstructs water flow.
- E. Hardware: Spring operators, hold-open arm, stainless-steel spring latch with turn handles, stainless-steel butt or pintle-type hinge system, and padlock hasps inside and outside.
1. Provide two-point latch on lids larger than 84-inches.
- 2.3 MISCELLANEOUS MATERIALS
- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
 - B. Glass-Fiber Board Insulation: ASTM C726, nominal density of 3 lb./cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.
 - C. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.
 - D. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPAC2; not less than 1-1/2-inches thick.
 - E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

F. Self-Adhering Sheet Membrane:

1. Self-Adhering, High-Temperature Waterproofing Membrane: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
2. Refer to Division 07 Section "Sheet Metal Flashing and Trim".

G. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish Series 300 stainless steel unless otherwise indicated:

H. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

I. Elastomeric Sealant: ASTM C920, elastomeric **silicone** polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

J. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.

2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Coat concealed side of uncoated aluminum and stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, or dissimilar metals, install a course of underlayment and cover with manufacturer's recommended slip sheet.
 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof Curb Installation: Install each roof curb so top surface is level.
- D. Equipment Support Installation: Install supports so top surfaces are level with each other.
- E. Roof-Hatch Installation:
1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
 2. Attach safety railing system to roof-hatch curb.
 3. Attach ladder-assist post according to manufacturer's written instructions.
- F. Pipe and Conduit Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.
1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
- G. Seal joints with elastomeric sealant as required by roof accessory manufacturer.
- 3.3 REPAIR AND CLEANING
- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.
- B. Clean exposed surfaces according to manufacturer's written instructions.
- C. Clean off excess sealants.
- D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Sealants for exterior and interior joints in both vertical and horizontal surfaces, including those specified by reference to this Section.
- B. Related Requirements:
 - 1. Division 04 Section "Historic Masonry Repair" for masonry repairs.
 - 2. Division 04 Section "Historic Masonry Repointing" for masonry repointing.
 - 3. Division 07 Sections "Slate Shingles," "PVC Roofing," "Sheet Metal Flashing and Trim", and "Roof Accessories" for roof-related sealant and assemblies.
 - 4. Division 08 Section "Historic Treatment of Wood Windows"

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct at project site to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.
 - 1. Advise other trades to ensure that no other work adversely affects sealer bonding surfaces.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product.
 - 1. For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
- B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.
- D. Qualification Data: For qualified testing agency.
- E. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

- F. Preconstruction Laboratory Test Reports: For each joint sealant and substrate material to be tested from sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.
- G. 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.
- H. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Authorized representative who is trained and approved by manufacturer.
 - 1. Installer must have a minimum of ten (10) years of continuous joint sealant installation experience and whose work has resulted in sealant installations with a record of successful in-service performance.
- B. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.

1.6 MOCKUPS

- A. Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
 - 1. For each kind and color of joint sealant selected, provide in-place field mockups with joint sealants in 1/2-inch-wide joints formed between the finished material on each side.
 - 2. Architect will approve mock-up prior to commencement of primary work.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Adhesion Testing: Use ASTM C794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Compatibility Testing: Use ASTM C1087 to determine sealant compatibility when in contact with glazing and gasket materials.
 - 3. Stain Testing: Use ASTM C1248 to determine stain potential of sealant when in contact with masonry or stone substrates.
 - 4. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
 - 5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 6. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.

7. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 2. Conduct field tests for each kind of sealant and joint substrate.
 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 5. Test Method: Test joint sealants in accordance with Method A, Tail Procedure, in ASTM C1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 6. 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.
 7. 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.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time and mixing instructions for multi-component materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, temperature, contaminants, or other causes.

1.9 FIELD CONDITIONS

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

1.10 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two (2) years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Ten (10) years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Source Limitations: Obtain each type of sealant through one source and from a single manufacturer.

2.2 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.
- C. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content:
 1. Architectural Sealants: 200 g/L.
 2. Sealant Primers for Nonporous Substrates: 200 g/L.
 3. Sealant Primers for Porous Substrates: 500 g/L.
- D. Liquid-Applied Joint Sealants: Comply with ASTM C920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C920 classifications for type, grade, class and uses related to exposure and joint substrates.
 1. Exterior Products: Provide products that have earned certificates from the "Product Validation Program" as administered by the Sealant, Waterproofing and Restoration Institute and have been tested and certified to comply with ASTM C719 and ASTM C793.
 2. 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 C1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

- E. Stain-Test-Response Characteristics: Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C1248 and have not stained porous joint substrates indicated for Project.
- F. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food; provide products that comply with 21 CFR 177.2600.
- G. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 50, NT: Single-component, non-sag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Dowsil 795" by Dow Chemical Co.
 - b. "864" by Pecora Corporation.
 - c. "Spectrem 2" by Tremco Incorporated.
 - 2. Uses Related to Substrates: M, G, A and as applicable to substrates indicated, O.
 - a. Use O Joint Substrates: Coated glass, galvanized steel, brick, masonry, granite, and wood.
 - 3. Stain-Test-Response Characteristics: Non-staining to porous substrates as per ASTM C1248.
 - 4. Applications: Exterior and interior joints in vertical surfaces of concrete and masonry; between concrete masonry and stone; between metal and concrete, mortar, or stone; interior and exterior perimeter joints of metal frames in exterior walls; exterior overhead joints; doors; windows; and where indicated.

2.4 URETHANE JOINT SEALANTS

- A. Multi-Component Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use T.
 - 1. Products: Provide one of the following or equal:
 - a. "THC-901" by Tremco.
 - b. "Sikaflex - 2c NS/SL" by Sika Corporation.
 - 2. Type and Grade: M (multi-component) and P (pourable).
 - 3. Uses Related to Joint Substrates: M, A and O.
 - a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, granite, limestone, marble, ceramic tile, and wood.
 - 4. Applications: Exterior control joints in horizontal surfaces of concrete; between metal and concrete, mortar, stone, unit pavers and masonry; and where indicated.

2.5 BUTYL JOINT SEALANTS

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

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. "Chem-Calk 300" by Bostik, Inc.
- b. "BC-158" by Pecora.

2.6 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Non-staining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Adfast.
 - b. Alcot Plastics Ltd.
 - c. Construction Foam Products; a division of Nomaco, Inc.
 - d. Master Builders Solutions.
- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 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: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include concrete, masonry, and unglazed ceramic tile.
 - 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 metal, glass, porcelain enamel, and 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.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Extent of Work: Seal all joints as noted and elsewhere at all interior and exterior joints, seams, and intersections between dissimilar materials. Provide elastomeric sealer installation with backer rod in all interior and exterior control joints.
- C. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- D. 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.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

- F. 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.
- G. Tooling of Non-Sag 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 C1193 unless otherwise indicated.
 - 4. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- H. Installation of SPF Sealant: Using dispenser of appropriate size and type for the project application, install SPF sealant in voids around perimeter of door frames, window frames, louvers, and curtain wall frames in exterior walls, to prevent the infiltration of outside air. Installation shall be in accordance with the recommendations of the foamed-in-place sealant manufacturer.
- I. Installation of Acoustical Sealant: At sound-rated assemblies, and where indicated, seal construction at perimeters, behind control joints, and at openings and penetrations. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform five (5) tests for the first 500 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
 - 2. Test Method: Test joint sealants in accordance with Method A, Tail Procedure, in ASTM C1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-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.
- C. Prepare test and inspection reports.

3.5 CLEANING

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

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 080352 - HISTORIC TREATMENT OF WOOD WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Furnish all labor, materials, tools and equipment necessary for the restoration, repair or replacement of existing wood window units and replacement of existing storm windows. Refer to Window Schedule for extents of removals, repairs and restoration.
 - 1. Restoration of existing wood window frames, trim and hardware.
 - 2. Replacement of wood window frames, sashes, components and hardware, where missing or non-original.
 - 3. Repair of wood windows and trim.
 - 4. Reglazing.
 - 5. Repairing and refinishing existing hardware.
 - 6. Removal and replacement of perimeter caulk with new sealant.
- B. Related Requirements:
 - 1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.
 - 2. Section 024296 "Historic Removal and Dismantling" for historic removal and dismantling work.
 - 3. Section 090391 "Historic Treatment of Plain Painting" for historic paint removal and application.

1.3 DEFINITIONS

- A. Glazing: Includes glass, glazing points, glazing tapes, glazing sealants, and glazing compounds.
- B. Window: Includes window frame, sash, hardware, storm window, and exterior and interior shutters unless otherwise indicated by context.
- C. Wood Window Component Terminology: Wood window components for historic treatment work include the following classifications:
 - 1. Frame Components: Head, jambs, and sill.
 - 2. Sash Components: Stiles and rails, parting bead, stop, and muntins.
 - 3. Exterior Trim: Exterior casing, brick mold, and cornice or drip cap.
 - 4. Interior Trim: Casing, stool, and apron.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of wood windows.
 - 2. Review methods and procedures related to historic treatment of wood windows including, but not limited to, the following:
 - a. Historic treatment specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.
 - c. Fire-protection plan.
 - d. Wood window historic treatment program.
 - e. Coordination with building occupants.

1.5 SEQUENCING AND SCHEDULING

- A. Sequencing and scheduling will require careful planning and coordination between the Owner, Construction Manager and all subcontractors, prior to and during the project.
- B. Address all existing hazardous materials as required and in coordination with project scheduling so as not to delay the Work.
- C. Order glass, replacement window hardware and other materials as early as possible to avoid delaying completion of work.
- D. Contractor shall provide temporary protection at windows removed as part of the Work outlined in this Section. Temporary protection of in-place windows shall be installed prior to and during all construction activities in that area.
- E. In an effort to prevent damage to existing windows and eliminate the need for extensive cleaning after installation: Contractor shall coordinate removal and transportation of wood windows scheduled to be restored and installation of temporary protection prior to commencement of work in a given area.
- F. Restored windows should be re-installed at end of project to avoid damage and reduce the need for extensive cleaning.
- G. Coordinate the restoration work with other trades as necessary to complete the work in this Section.

1.6 COORDINATION

- A. Perform all Work in accordance with the provisions of the Contract Documents and coordinate the Work of this Section completely with the Work of all other trades.

1.7 HAZARDOUS MATERIALS

- A. If applicable, hazardous materials shall be addressed by the General Contractor and the Owner.

1.8 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include recommendations for product application and use. Include test data substantiating that products comply with requirements.
- B. Shop Drawings:
 - 1. Include plans, elevations, and sections showing locations and extent of repair and replacement work, with enlarged details of replacement parts indicating materials, profiles, joinery, reinforcing, method of splicing into or attaching to existing wood window, accessory items, and finishes.
 - 2. Include field-verified dimensions and the following:
 - a. Full-size shapes and profiles with complete dimensions for replacement components and their jointing, showing relation of existing to new components.
 - b. Templates and directions for installing hardware and anchorages.
 - c. Identification of each new unit and its corresponding window locations in the building on annotated plans and elevations.
 - d. Provisions for and details associated with removable, painted wood infill panels connected to Owner-provided free-standing air conditioning units. Details shall include full-size shapes and profiles with complete dimensions coordinated with existing window assemblies, showing the panels' relation to existing components.
 - e. Provisions for sealant joints as required for location.
- C. Samples for Initial Selection: For each type of exposed wood and finish.
 - 1. Identify wood species, cut, and other features.
 - 2. Include Samples of hardware and accessories involving color selection.
- D. Samples for Verification: For the following products in manufacturer's standard sizes unless otherwise indicated, finished as required for use in the Work:
 - 1. Replacement Units: 12-inch-long, full-size frame and sash sections with applied finish.
 - 2. Replacement Members: 12 inches long for each replacement member, including parts of frame, sash, exterior trim, and interior trim.
 - a. Additional Samples of replacement members that show fabrication techniques, materials, and finishes as requested by Architect.
 - 3. Repaired Wood Window Members: Prepare Samples using existing wood window members removed from site, repaired, and prepared for refinishing.
 - 4. Refinished Wood Window Members: Prepare Samples using existing wood window members removed from site, repaired, and refinished.
 - 5. Hardware: Full-size units with each factory-applied or restored finish.
 - 6. Weather Stripping: 12-inch-long sections of each type.
 - 7. Glass: Full-size units of each type and appearance.

1.9 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For historic treatment specialist.

- B. Wood Window Historic Treatment Program: Submit before work begins.
- C. Preconstruction Test Reports: For historic treatment of wood windows.

1.10 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: A qualified historic wood window specialist, experienced in repairing, refinishing, and replacing wood windows in whole and in part. Experience only in fabricating and installing new wood windows is insufficient experience for wood-window historic treatment work.
 - 1. Relevant Experience: The specialty contractor shall present three (3) or more projects completed in the last five (5) years which demonstrate the Contractor's ability to perform the work of this Project to the satisfaction of the Owner and Architect.
 - 2. Skilled and Available Craftspeople: The historic wood window specialist shall provide evidence of employment of sufficiently skilled craftspeople.
 - a. Field and Shop Supervisors: All supervision of work related to this project shall be performed by a supervisor with a minimum of ten (10) years of experience in performing work similar to this Project.
 - b. Craftspeople and Installers: All craftspeople and installers shall have at least three (3) years of experience in performing work similar to this Project. Each apprentice (less than three (3) years of experience) must be directly supervised by an experienced craftsperson or installer.
 - c. Knowledge of Contract Documents: The specialty contractor will familiarize all supervisors, craftspeople and installers with the most current drawings or specifications required to properly complete the work of this Section.
 - d. Shop/Facility: The specialty contractor's facility shall be properly equipped and of sufficient size and capacity to accommodate and process the work under this Section in a timely and cost effective manner.
 - 3. Contractor Knowledge of the Work: The specialty contractor is presumed to be familiar with the requirements of the Project as they pertain to the successful and timely completion of the work described in this Section before submitting a bid for the work.
 - 4. Specialty contractor shall provide Owner, Architect, Engineer and/or Construction Manager with access to their studio at any time during the work on this Project.
- B. Wood-Repair-Material Manufacturer Qualifications: A firm regularly engaged in producing wood consolidant and wood-patching compound that have been used for similar historic wood-treatment applications with successful results, and with factory-authorized service representatives who are available for consultation and Project-site inspection and on-site assistance.
- C. Wood Window Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for historic treatment work, including protection of surrounding materials and Project site.
 - 1. If materials and methods other than those indicated are proposed for any phase of historic treatment work, add a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project.

- D. Mockups: Prepare mockups of historic treatment repair processes to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation. Prepare mockups so they are as inconspicuous as practicable.
1. Locate mockups on existing windows where directed by Architect and in locations that enable viewing under same conditions as the completed Work.
 2. Repaired and Restored Existing Wood Window Assembly: One (1) full-sized mock-up of a restored wood assembly using materials and methods specified in this Section to serve as a mockup to demonstrate samples of each type of repair of wood window members, including frame, sash, glazing, and hardware.
 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.

1.11 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified historic treatment specialist to perform preconstruction testing on historic wood windows.
1. Provide test specimens representative of proposed materials and existing construction.
 2. Test historic treatment products and methods for effectiveness and compliance with specified requirements.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Pack, deliver, and store products in suitable packs, heavy-duty cartons, or wooden crates; surround with sufficient packing material to ensure that products are not deformed, broken, or otherwise damaged.
- B. Store products inside a well-ventilated area and protect from weather, moisture, soiling, abrasion, extreme temperatures, and humidity, and where environmental conditions comply with manufacturer's requirements.
- C. Labeling: See Part 3.

1.13 FIELD CONDITIONS

- A. Weather Limitations: Proceed with historic treatment of wood windows only when existing and forecasted weather conditions are within the environmental limits set by each manufacturer's written instructions and specified requirements.

PART 2 - PRODUCTS

2.1 HISTORIC TREATMENT OF WOOD WINDOWS, GENERAL

- A. Quality Standard: Comply with applicable requirements in Section 12, "Historic Restoration Work," and related requirements in AWI/AWMAC/WI's "Architectural Woodwork Standards" for construction, finishes, grades of wood windows, and other requirements unless otherwise indicated.
 - 1. Exception: Industry practices cited in Section 12, Article 1.5, Industry Practices, of the Architectural Woodwork Standards do not apply to the work of this Section.

2.2 WOOD-REPLACEMENT MATERIALS

- A. Wood, General: Clear fine-grained lumber; kiln dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch deep by 2 inches wide.
 - 1. Species: Match species of each existing type of wood component or assembly, unless otherwise indicated.
- B. Frame Heads and Jambs and Exterior Trim: African mahogany or similar naturally decay-resistant species.
- C. Exterior Trim: African mahogany or similar naturally decay-resistant species.
- D. Sills: All-heart vertical grain redwood, African mahogany or similar naturally decay-resistant species.
- E. Sash Components: Match existing species.
- F. Interior Trim: Match existing species.

2.3 WOOD-REPAIR MATERIALS

- A. Source Limitations: Obtain wood consolidant and wood-patching compound from single source from single manufacturer.
- B. Wood Consolidant: Ready-to-use product designed to penetrate, consolidate, and strengthen soft fibers of wood materials that have deteriorated due to weathering and decay and designed specifically to enhance the bond of wood-patching compound to existing wood.
 - 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. Abatron, Inc; LiquidWood.
 - b. ConServ Epoxy LLC; Flexible Epoxy Consolidant 100.
 - c. Gougeon Brothers, Inc.; West System.
 - d. Protective Coating Company; PC-Petrifier.
 - e. System Three Resins, Inc.; RotFix.

- C. Wood-Patching Compound: Two-part epoxy-resin wood-patching compound; knife-grade formulation as recommended in writing by manufacturer for type of wood repair indicated, tooling time required for the detail of work, and site conditions. Compound shall be designed for filling voids in damaged wood materials that have deteriorated due to weathering and decay. Compound shall be capable of filling deep holes and spreading to feather edge.
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. Abatron, Inc; LiquidWood with WoodEpoxy.
 - b. Advanced Repair Technology, Inc.; Primatrate with Flex-Tec HV.
 - c. ConServ Epoxy LLC; Flexible Epoxy Consolidant 100 with Flexible Epoxy Patch 200.
 - d. Gougeon Brothers, Inc.; West System thickened with filler.
 - e. Polymeric Systems, Inc; QuickWood.
 - f. Protective Coating Company; PC-Woody.
 - g. System Three Resins, Inc.; Sculpwood.

2.4 GLAZING MATERIALS

- A. Glass: Glass shall match existing single-pane, clear float glass.
- B. Glazing Systems:
1. Traditional Glazing Products: Glazing points and oil-based glazing putty or latex glazing compound. Tint to required color according to manufacturer's written instructions.
 2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
 - a. Sarco Putty Company, Inc.; SarcoSeal Multi-Glaze Elastic Glazing Compound Type M.
 - b. United Gilsonite Laboratories; Glazol Glazing Compound.
 - c. Or approved equal.
 3. Primers and Cleaners for Glazing: As recommended in writing by glazing material manufacturer.

2.5 HARDWARE

- A. Window Hardware: Provide complete sets of window hardware consisting of sash balances, hinges, pulls, latches, and accessories indicated for each window or required for proper operation. Sets shall include replacement hardware to complement repaired and refinished existing hardware. Window hardware shall smoothly operate, tightly close, and securely lock wood windows and be sized to accommodate sash or ventilator weight and dimensions.
- B. Other Hardware: Provide complete sets of hardware for each type of storm window and insect screen consisting of hinges, pulls, latches, and accessories indicated or required for proper operation. Hardware shall smoothly operate, tightly close, and secure units appropriately for unit weight and dimensions.

- C. Replacement Hardware: Replace existing damaged or missing hardware with new hardware manufactured by one of the following:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Architectural Resource Center (The).
 - b. Ball and Ball.
 - c. Blaine Window Hardware Inc.
 - d. Bronze Craft Corporation (The).
 - e. Phelps Company.
 - f. Smith Restoration Sash.
- D. Material and Design:
1. Material: Solid bronze of alloy indicated, unless otherwise indicated.
 2. Design: Match type and appearance of existing hardware.
 3. Weight and Pulley Sash-Balance: Concealed weight and pulley balance system including steel or cast iron weights, cast-bronze pulleys, bronze sash chain; size and capacity to hold sash stationary at any open position.
 4. Replacement Window Hardware: Match existing window hardware, which includes but is not limited to window latches and pulls:
- E. Hardware Finishes: Comply with BHMA A156.18 for base material and finish requirements indicated by the following:
1. BHMA 605: Bright brass, clear-coated; brass base metal.
 2. BHMA 606: Satin brass, clear-coated; brass base metal.

2.6 WEATHER STRIPPING

- A. Compression-Type Weather Stripping: Compressible weather stripping designed for permanently resilient sealing under bumper or wiper action; completely concealed when window is closed.
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. Schlegel; Q-LON seals.
 - b. Or approved equal.
 2. Weather-Stripping Material: Match existing materials and profiles as much as possible unless otherwise indicated.
 - a. Cellular Elastomeric Gaskets: Preformed; complying with ASTM C 509.
 - b. Dense Elastomeric Gaskets: Preformed; complying with ASTM C 864.
- B. Sliding-Type Weather Stripping: Woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric.
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. Schlegel; Q-LON seals.
 - b. Or approved equal.
 2. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material.
- C. Metal Weather Stripping: Zinc weather stripping; designed either as one piece to seal by sliding into a groove in the sash or as two pieces that interlock; and completely concealed when window is closed. Metal weather stripping shall be provided at the window jambs only.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Accurate Metal Weatherstrip Co. Inc.
 - b. Zero International, Inc.

2.7 MISCELLANEOUS MATERIALS

- A. Borate Preservative Treatment: Inorganic, borate-based solution, with disodium octaborate tetrahydrate as the primary ingredient; manufactured for preserving weathered and decayed wood from further damage by decay fungi and wood-boring insects; complying with AWWA P5; containing no boric acid.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Abatron, Inc.
 - b. Nisus Corporation.
 - c. System Three Resins, Inc.
- B. Cleaning Materials:
 1. Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 1/2 cup of laundry detergent that contains no ammonia, 5 quarts of 5 percent sodium hypochlorite bleach, and 15 quarts of warm water for each 5 gal. of solution required.
 2. Mildewcide: Commercial, proprietary mildewcide or a solution prepared by mixing 1/3 cup of household detergent that contains no ammonia, 1 quart of 5 percent sodium hypochlorite bleach, and 3 quarts of warm water.
- C. Adhesives: Wood adhesives for exterior exposure, with minimum 15- to 45-minute cure at 70 deg F, in gunnable and liquid formulations as recommended in writing by adhesive manufacturer for each type of repair.
- D. Fasteners: Use fastener metals that are noncorrosive and compatible with each material joined.
 1. Match existing fasteners in material and type of fastener unless otherwise indicated.
 2. Use concealed fasteners for interconnecting wood components.
 3. Use concealed fasteners for attaching items to other work unless exposed fasteners are the existing fastening method.
 4. For fastening metals, use fasteners of same basic metal as fastened metal unless otherwise indicated.

5. For exposed fasteners, use Phillips-type machine screws of head profile flush with metal surface unless otherwise indicated.
6. Finish exposed fasteners to match finish of metal fastened unless otherwise indicated.

- E. Anchors, Clips, and Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel complying with requirements in ASTM B 633 for SC 3 (Severe) service condition.

2.8 WOOD WINDOW FINISHES

- A. Shop-Finished Units: Alkyd finish system consisting of two primer coats, two base coats and one finish coat on exposed exterior and interior wood surfaces.
1. Colors and Finishes: To match existing, as selected by Architect from full range of industry colors and finishes.
 2. Primers and Sealers:
 - a. Alkyd, Sanding Sealer, Clear: MPI #102.
 - b. Shellac: MPI#88.
 3. Polyurethane Coatings:
 - a. Polyurethane, Two-Component, Pigmented, Gloss (Gloss Level 6): MPI #72
 4. Finish Coats: Match intermediate coat and topcoat products used for adjacent, repaired wood windows, as specified in Section 090391 "Historic Treatment of Plain Painting."
 5. Color and Gloss: Match existing color and gloss.

PART 3 - EXECUTION

3.1 HISTORIC TREATMENT SPECIALIST

- A. Historic Treatment Specialist Firms: Subject to compliance with requirements, firms that may provide historic treatment of wood windows include, but are not limited to, the following:
1. Femenella & Associates; 10 County Line Road, Suite 24, Branchburg, NJ 08876
 2. Cooper Group; 75 Frontage Road, Suite 101, North Stonington, CT 06359
 3. Window Woman of New England; 44R Elm Street, Amesbury, MA 01913
 4. Newport Window Restoration; 65 Dr Marcus Wheatland Blvd, Newport, RI 02840

3.2 PREPARATION

- A. Protect adjacent materials from damage by historic treatment of wood windows.
- B. Clean wood windows of mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris by scrubbing with bristle brush or sponge and detergent solution. Scrub mildewed areas with mildewcide. After cleaning, rinse thoroughly with fresh water. Allow to dry before repairing or painting.
- C. Photograph each window. All photos should be clear and well lit. Photos should show the general appearance of the window and its surrounding framework. Additional close-up detail photos should be taken as necessary to record unusual conditions, specific defects, broken or missing hardware, etc. Each photograph shall be clearly labeled to identify the window's location and

include any interpretive information required. The following photographs shall be provided, at a minimum:

1. Before window removal: 1 interior, 1 exterior.
 2. After reinstallation of window: 1 interior, 1 exterior.
- D. Label each window unit and its components clearly and indelibly marked (media-blast-proof, where appropriate) in a way that ensures they are returned to the correct location and properly oriented when reinstalled after restoration. Labelling shall not mar window or be visible after final installation.
- E. Field verify all dimensions as required to ensure proper re-installation of the restored window units. Immediately notify General Contractor of any conflicting construction tolerances related to this work that, in the opinion of the specialty contractor, may result in improper installation, for further review and consideration by the Architect. Out-of-tolerance and/or non-conforming work installed without prior review and approval by the Architect will be subject to removal and in-kind replacement at the sole discretion of the Architect, at no cost to the Owner.
- F. Prepare work area to contain debris generated during window removal process and facilitate a thorough cleanup.
- G. Putty/sealant removal for wood window units with clear glass:
1. Carefully remove all window HVAC units and non-original infill window panels associated with equipment. Store for re-installation with re-installation of restored windows, where required.
 2. Remove old putty/sealants from perimeter of all wood units, unless otherwise noted. Refer to Division-02 Section "Environmental" for information related to removals of hazardous materials.
 3. Remove wood window sashes from window opening. Dismantle hardware and tag hardware with opening-identification numbers. Use caution to avoid twisting or racking of wood sashes or their joinery, and use care in handling to avoid further damage (including scratching and marring of wood surfaces).
 4. Clean wood frame in situ, removing all putty/sealant debris from perimeter of frame, adjacent to masonry.
 5. Exercise extreme care so as not to damage masonry in any way.
- H. Bag all window units and components to contain debris in handling and transport to specialty contractor's studio for restoration.
- I. Install temporary weather protection in each opening immediately after window unit is removed.
1. For masonry openings:
 - a. Weather protection will consist of clear 0.118 polycarbonate material with a framework of 1" x 1" pine baluster secured to frame with all-weather coated deck screws. Minimize new holes in wood frame to the greatest extent possible. Space between window jamb opening and weather protection will be filled with backer rod (not caulked).
- J. Clean work area to contain all debris for transport to specialty contractor's studio and disposal.

- K. Crate, load and transport all window units and components to specialty contractor's studio for restoration. Take all precautions necessary to prevent bending, twisting, racking, scratching or marring of window units during handling and transport.
- L. Condition replacement wood members and replacement units to prevailing conditions at installation areas before installing.

3.3 HISTORIC TREATMENT OF WOOD WINDOWS, GENERAL

- A. Historic Treatment Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from the window interior at 5 feet away and from the window exterior at 20 feet away.
- B. General: In treating historic items, disturb them as minimally as possible and as follows:
 - 1. Stabilize and repair wood windows to reestablish structural integrity and weather resistance while maintaining the existing form of each item.
 - 2. Remove coatings and apply borate preservative treatment before repair. Remove coatings according to Section 090391 "Historic Treatment of Plain Painting" unless otherwise indicated.
 - 3. Repair items in place where possible.
 - 4. Install temporary protective measures to protect wood window work that is indicated to be completed later.
 - 5. Refinish historic wood windows according to Section 090391 "Historic Treatment of Plain Painting" unless otherwise indicated.
- C. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use only the gentlest mechanical methods, such as scraping and natural-fiber bristle brushing, that will not abrade wood substrate, reducing clarity of detail. Do not use abrasive methods such as sanding, wire brushing, or power tools except as indicated as part of the historic treatment program and as approved by Architect.
- D. Repair and Refinish Existing Hardware: Dismantle window hardware; strip paint, repair, and refinish it to match finish samples; and lubricate moving parts just enough to function smoothly. Existing sash chains, pulleys and cords shall be replaced at all windows with new sash chains and pulleys.
- E. Repair Wood Windows: Match existing materials and features, retaining as much original material as possible to perform repairs.
 - 1. Unless otherwise indicated, repair wood windows by consolidating, patching, splicing, or otherwise reinforcing wood with new wood matching existing wood or with salvaged, sound, original wood, unless otherwise indicated.
 - 2. Where indicated, repair wood windows by limited replacement matching existing material.
 - 3. Sash Balance: Repair sash balances to function according to type as specified in "Hardware" Article" above. Provide missing sash balances.
- F. Replace Wood Units: Where indicated, duplicate and replace units with units made from salvaged, sound, original wood or with new wood matching existing wood, unless otherwise noted. Use surviving prototypes to create patterns for duplicate replacements.
 - 1. Do not use substitute materials unless otherwise indicated.

2. Compatible substitute materials may be used.

- G. Protection of Openings: Where sash or windows are indicated for removal, cover resultant openings with temporary enclosures so that openings are weathertight during repair period.
- H. Identify removed windows, frames, sash, and members with numbering system corresponding to window locations to ensure reinstallation in same location. Key windows, sash, and members to Drawings showing location of each removed unit. Permanently label units in a location that will be concealed after reinstallation.

3.4 WOOD WINDOW UNIT RESTORATION

- A. Perform historic treatment of wood windows in the following sequence, which includes work specified in this and other Sections:
1. Label each window frame with permanent opening-identification number in inconspicuous location.
 2. Remove and discard existing exterior storm window assemblies.
 3. Remove and salvage existing window air conditioning units and associated infill material.
 4. Remove all existing window accessories, unless otherwise noted.
 5. Tag existing window sash and shutters with opening-identification numbers and remove for on-site or off-site repair. Indicate on tags the locations on window of each component, such as "top sash," "bottom sash," "left shutter," and "right shutter." Existing window frames shall remain in place for in situ repair and restoration.
 6. Install temporary protection and security at window openings.
 7. In the shop, label each sash and shutter with permanent opening-identification number in inconspicuous location and remove site-applied tags.
 8. Dismantle existing window hardware and tag hardware with opening-identification numbers.
 9. Sort units by condition, separating those that need extensive repair.
 10. Clean surfaces.
 11. General Wood-Repair Sequence:
 - a. Remove paint to bare wood.
 - b. Rack frames slightly to inject adhesive into mortise and tenon joints; square frames to proper fit before adhesive sets.
 - c. If thicker than original glass is required, rout existing muntins to required rebate size.
 - d. Repair wood by consolidation, member replacement, partial member replacement, and patching.
 - e. Sand, prime, fill, sand again, and prime surfaces again for refinishing.
 12. Repair, refinish, and replace hardware if required. Submit mock-up for approval of desired finish. Reinstall operating hardware.
 13. Install glazing.
 14. Remove temporary protection and security at window openings.
 15. Reinstall units.
 16. Apply finish coats.
 17. Install remaining hardware and weather stripping.
 18. Install new storm windows.

3.5 WOOD WINDOW PATCH-TYPE REPAIR

- A. General: Patch wood members that exhibit depressions, holes, or similar voids, and that have limited amounts of rotted or decayed wood.
 - 1. Remove sash and storm windows from windows before performing patch-type repairs at meeting or sliding surfaces unless otherwise indicated. Reglaze units before reinstallation.
 - 2. Verify that surfaces are sufficiently clean and free of paint residue before patching.
 - 3. Remove rotted or decayed wood down to sound wood.
- B. Apply borate preservative treatment to accessible surfaces either before applying wood consolidant or after removing rotted or decayed wood. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom. Allow treatment to dry.
- C. Apply wood-patching compound to fill depressions, nicks, cracks, and other voids created by removed or missing wood.
 - 1. Prime patch area with application of wood consolidant or manufacturer's recommended primer.
 - 2. Mix only as much patching compound as can be applied according to manufacturer's written instructions.
 - 3. Apply patching compound in layers as recommended in writing by manufacturer until the void is completely filled.
 - 4. Sand patch surface smooth and flush with adjacent wood, without voids in patch material, and matching contour of wood member.
 - 5. Clean spilled compound from adjacent materials immediately.

3.6 WOOD WINDOW MEMBER-REPLACEMENT REPAIR

- A. General: Replace parts of or entire wood window members at locations indicated on Drawings and where damage is too extensive to patch.
 - 1. Remove sash, storm windows and shutters from windows before performing member-replacement repairs, unless otherwise indicated.
 - 2. Verify that surfaces are sufficiently clean and free of paint residue before repair.
 - 3. Remove broken, rotted, and decayed wood down to sound wood.
 - 4. Custom fabricate new wood to replace missing wood; either replace entire wood member or splice new wood part into existing member.
 - 5. Secure new wood using finger joints, multiple dowels, or splines with adhesive and nailing to ensure maximum structural integrity at each splice. Use only concealed fasteners. Fill nail holes and patch surface to match surrounding sound wood.
- B. Apply borate preservative treatment to accessible surfaces after replacements are made. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom.
- C. Repair remaining depressions, holes, or similar voids with patch-type repairs.
- D. Clean spilled materials from adjacent surfaces immediately.
- E. Glazing: Reglaze units before reinstallation.

1. Provide glazing stops to match contour of sash frames, where repair is indicated on the Drawings.

F. Reinstall units removed for repair into original openings.

G. Weather Stripping: Replace all existing weather stripping to ensure full-perimeter and meeting rail weather stripping for each operable sash.

3.7 GLAZING

A. Comply with combined written instructions of manufacturers of glass, glazing systems, and glazing materials, unless more stringent requirements are indicated.

B. Remove glass and glazing from openings and prepare surfaces for reglazing. Cracked and damaged glass shall be discarded. All other (undamaged) glass shall be salvaged for reinstallation.

C. Size new glass as required by Project conditions to provide necessary bite on glass, minimum edge and face clearances, with reasonable tolerances.

D. Apply primers to joint surfaces where required for adhesion of glazing system, as determined by preconstruction testing.

E. Install setting bead, side beads, and back bead against stop in glazing rabbets before setting glass.

F. Install glass with proper orientation so that coatings, if any, face exterior or interior as required.

G. Install glazing points.

H. Disposal of Removed Glass Scheduled to be Discarded: Remove from Owner's property and legally dispose of it, unless otherwise indicated.

I. Install weather stripping for tight seal of joints as determined by preconstruction testing and demonstrated in mockup.

3.8 FIELD QUALITY CONTROL

A. Manufacturers Field Service: Engage wood-repair-material manufacturers' factory-authorized service representatives for consultation and Project-site inspection and to provide on-site assistance when requested by Architect.

3.9 ADJUSTING

A. Adjust existing and replacement operating sash, hardware, weather stripping, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.10 CLEANING AND PROTECTION

- A. Protect window surfaces from contact with contaminating substances resulting from construction operations. Monitor window surfaces adjacent to and below exterior concrete and masonry during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances contact window surfaces, remove contaminants immediately.
- B. Protect installed windows adjacent to ongoing construction activities until Work is complete.
- C. Clean exposed surfaces immediately after historic treatment of wood windows. Avoid damage to coatings and finishes. Remove excess sealants, glazing and patching materials, dirt, and other substances.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction.

END OF SECTION 080352

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Instructions to Bidders, General Provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections; and Drawings apply to this Section and shall be binding on the Contractor and all Filed Sub-Bid Contractors and Subcontractors who perform the Work for this Project.

1.2 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems on the existing historic cast iron.
 - 1. Scope of work to include surfaces of restored cast iron that will remain exposed.
 - 2. Refer to the Drawings for additional information.

1.3 DEFINITIONS

- A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.4 SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8-inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.
- E. Construction Waste Management Plan: Including removal of media and waste from blast cleaning operations.

1. Refer to Division 01 Section "Construction Waste Management and Disposal."

- F. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings Five percent (5%), but not less than 1 gallon of each material and color applied.

1.5 QUALITY ASSURANCE

- A. 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 areas in field which represent conditions for application of each coating system.
 - a. Exposed Cast Iron: Provide four (4) full size samples of at least 10 LF in length.
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F, unless otherwise required in writing by the coating manufacturer.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F, unless otherwise required in writing by the coating manufacturer.
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.
- D. Protection of Adjacent Materials:
 1. Protect all existing adjacent materials and surfaces during the execution of the Work. Provide all necessary protection and work procedures to avoid coating contact and other damage to adjacent stonework, glass, ornamental metals, hard and soft landscape materials, sidewalks, utilities, equipment, and all other existing and new exterior materials, and assemblies.

2. Repair all damage to adjacent materials caused by the execution of the Work of this section at no expense to Owner. Damaged materials shall be repaired or replaced by mechanics experienced in the respective type of work, to the satisfaction of the Architect.
3. Maintain a clean work area at all times. Clean up materials and equipment; sweeping clear the area of all debris matter; minimally once a day at the end of each shift.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations:
 1. Obtain materials and accessories for high-performance coating systems from single source from single manufacturer.
- B. Manufacturers:
 1. Basis-of-Design Manufacturer:
 - a. Tnemec Company, Inc.
 2. Alternate Manufacturers: Subject to compliance with specifications and evaluation by Architect and Owner, provide approved equivalent high-performance coatings systems from alternate single-source manufacturer. Refer to source limitations above.

2.2 HIGH-PERFORMANCE COATINGS

- A. High-Performance Coatings: Subject to compliance with requirements, provide the following:
 1. Basis of Design:
 - a. Primer Coat: Epoxy, anti-corrosive, for metal, Omnithane Series 1 by Tnemec.
 - b. Intermediate Coat: Epoxy, Hi-Build Epoxoline II Series N69 by Tnemec.
 - c. Topcoat: Epoxy, semi-gloss, Fluoronar Series 1071 by Tnemec.
- B. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- C. Material Compatibility:
 1. Materials for use within each coating system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a coating system, products shall be recommended in writing by topcoat manufacturers for use in coating system and on substrate indicated.
 3. Products shall be of same manufacturer for each coat in a coating system.
- D. Colors: As selected by Architect from manufacturer's full range.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
 1. Owner may engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are

- taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and 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, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible coatings and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Cast Iron Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by coating manufacturer, but not less than as per SSPC-SP6/NACE No. 3.
 1. Disposal of cleaning materials:
 - a. It is the Contractor's sole responsibility to collect, package and dispose of materials used in the cleaning process. All media and waste from blast cleaning operations shall be captured and fully contained from the surface of the work to the point of removal from the site; prevent contact with building surfaces, public circulation, and existing drainage systems.

- b. Disposal shall be in accordance with regulations enacted by appropriate governmental agencies and Authorities Having Jurisdiction.
- c. Refer to Division 01 Section "Construction Waste Management and Disposal" for Waste Management Plan requirements.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for coating and substrate indicated.
 - 2. Coat all sides of steel, iron, and wrought iron members.
- B. 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.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. Upon completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

END OF SECTION 099600

SECTION 108000 - BIRD CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Instructions to Bidders, General Provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections; and Drawings apply to this Section and shall be binding on the Contractor and all Filed Sub-Bid Contractors and Subcontractors who perform the Work for this Project.

1.2 SUMMARY

- A. The work of this Section includes bird control systems, designed to discourage bird roosting, on all exposed pavilion stair roof horizontal steel framing.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design bird control systems, including comprehensive engineering analysis by a qualified professional engineer, licensed in the state in which the Project is located.
- B. Thermal and Wind Movements: Allow for movement from ambient and surface temperature changes and wind acting on bird control systems by preventing failure of anchorages, bird control systems and surrounding construction.

1.4 SUBMITTALS

- A. Product Data, Certificates and Test Reports: For each product.
- B. Samples: Manufacturer's standard bird control system samples and color charts showing the full range of colors available for each product exposed to view.
- C. Shop Drawings: Show fabrication and installation details.
 - 1. Include plans, sections and details. Show anchorage and accessory items.
- D. Qualification Data: For qualified Installer.
- E. Warranty: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced, manufacturer's authorized installer who is trained and approved for installation of bird control system for this Project and whose work has resulted in bird free installations with a record of successful in-service performance.
- B. Source Limitations: Obtain products from a single source, and from a single manufacturer.
- C. Pre-Installation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site in original unopened packing with labels indicating manufacturer, product name and designation.
- B. Protect from damage, before, during and after installation.

1.7 PROJECT CONDITIONS

- A. Provide all anchorage devices, hardware, etc. as required to fasten the bird control system to the structure. Coordinate and verify adjacent construction and conditions.
- B. Field measure prior to fabrication and delivery of materials.

1.8 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which bird control system manufacturer agrees to repair or replace items which do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BIRD CONTROL SYSTEM

- A. Basis of Design Product: Subject to compliance with requirements, provide the following:
 - 1. "Springuard Trident Post & Wire Anti-Roosting System - 3 Post Arrangement" by BirdMaster Control Systems.
- B. Wires/Cables: High-grade stainless steel, 0.015-inch diameter full-hard spring temper wire.
 - 1. Finish: Natural stainless steel.
- C. Springs: High-grade stainless steel, 3/16-inch diameter and 1/2-inch in length.
- D. Base: Lexan plates, 2-inches by 3/4-inch by 3/8-inch, pre-drilled.
- E. Fastening: Adhesive fastening method as recommended by the manufacturer. Include all accessories required for a complete installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas indicated to receive bird control systems, with Installer present, for compliance with requirements for proper installation, anchorage and performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Work areas shall be cleaned, repaired and ready to receive bird control systems.
- B. Remove or repair articles that may damage the bird control systems after installation.

3.3 INSTALLATION OF BIRD CONTROL SYSTEMS

- A. General: Install bird control systems as recommended by the manufacturer. Systems shall fit the area to be protected perfectly so pest birds cannot enter the protected area.
 - 1. Protect entire surface, not just the outside edges. No gaps allowed.
- B. Provide proper attachment to adjacent mounting surfaces.
- C. Posts shall be spaced 60-inches maximum on center over the ledge length and 3-inches apart over the ledge depth.
- D. Stainless steel wires must be spring tensioned to the correct level as recommended by the manufacturer. Loose installations will not be acceptable.

3.4 PROTECTION

- A. Protect bird control systems during and after installation period from damage resulting from construction operations or other causes so systems are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, remove damaged or deteriorated work immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 108000